TRAFFIC ENGINEERING

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THE END OF A DECADE

By HAWLEY S. SIMPSON, *President, Institute of Traffic Engineers*

WITH this issue of TRAFFIC ENGINEERING, the Institute of Traffic Engineers marks the beginning of its second decade. Measured in terms of human activities ten years is not a very long period of time, but in traffic engineering it represents fully 2/3rds of its life span.

Ten years ago the ink was hardly dry on the first manual on traffic signs, signals and markings; its recommendations were still being debated pro and con. Progressive signaling was more talked about than practiced; traffic actuated signals were still in their development stage. The investigation of accidents by the use of collision diagrams was a new and much talked about technique. Spot maps were a comparative rarity and none had been developed with the refinements which they contain today. Highway designers had not turned to the traffic engineer for advice, because the traffic engineer had little to offer. Formal education in traffic engineering was only in its preliminary stages.

These are merely examples picked at random to show where traffic engineering stood in 1930. But all this has now changed. Well developed and acceptable techniques of collecting and analyzing traffic data have been established. Traffic signals, both progressive and traffic actuated, have been improved so that they are readily adaptable to any traffic condition. Full time professional training is being given regularly at Yale University by the Bureau for Street Traffic Research with short courses in traffic engineering in numerous other places, particularly adapted for men in related fields who wish to become familiar with the principles of traffic engineering.

Traffic engineers can, therefore, look back on a record of achievement in the past ten years which has measurably added to the prestige of the profession and established it on a permanent basis. The development era has passed and traffic engineering is now entering a period of expansion. Almost every city of any importance today has a traffic engineering department with capable men in charge. Highway engineering departments are rapidly availing themselves of traffic engineering techniques. Traffic engineers are to be found in the employ of many organizations, other than governmental, whose interests bring them into close contact with the transportation problems, and consulting services in traffic engineering are being developed.

During all of this period the Institute of Traffic Engineers has played an important part in the development of the field and it can be said without qualification that it has established itself firmly as a continuing technical organization. Despite its limited finances it has succeeded, by the voluntary and wholehearted cooperation of its members, in accomplishing much of real value in the advancement of the interest of traffic engineering. Plans now in progress which, when consummated, will provide a new source of revenue sufficient to establish a permanent headquarters and maintain a paid staff will enable the Institute to serve more adequately in promoting the broader adoption of approved traffic engineering techniques.

Like each of the preceding years, the one just passed has marked sev-

eral significant accomplishments to the credit of the Institute. Most outstanding has been the increasing emphasis on the gathering and dissemination of traffic engineering information. The Annual Proceedings has been improved in form, the Institute section in American City has been expanded, TRAFFIC ENGINEERING has appeared in a new dress, a booklet describing in detail the organization of all city traffic engineering departments has been published and widely sold and work on a HANDBOOK OF TRAFFIC ENGINEERING has been energetically begun. The publication of this latter book, scheduled for the coming year, and made possible through funds provided by the National Conservation Bureau will make available for the first time in concise form a thorough treatise on traffic engineering—not a text book—but a working manual which will prove a necessity to every traffic engineer.

Research activities have largely been concentrated on the production of a series of standard specifications for traffic signal equipment, both signal heads and controllers. The adoption of these specifications by traffic engineers throughout the field will do much to improve the character and performance of equipment provided for traffic control purposes.

Increasingly the Institute is turning its attention to cooperative projects with other national organizations in which members will lend their technical aid in activities relating to traffic which are more general than technical in nature but which will be beneficial to all traffic engineers. In this work members represent the Institute, rather than themselves as individuals, and in this way the Institute is becoming more widely known and recognized as representing the technical approach to the traffic problem. At the present time the Institute is engaged in eight such cooperative projects and plans are under way for the inauguration of others. It is believed that the Institute, as at present constituted, can better serve to advance the interests of the profession in this way than by attempting to set up independent projects which might, in many cases, duplicate work being done by other organizations.

With a continually expanding membership and with the same sort of cooperation from its membership, the Institute can look forward confidently to a new period of greater influence on all aspects of the traffic problem, safe in the assurance that the foundations have been well-laid and that the structure to be built thereon will have a permanent place in our national life.

MARGINAL LAND ACQUISITION FOR HIGHWAYS

By H. R. BRIGGS

INCREASING interest has been directed in recent years to the problem of providing adequate rights-of-way for streets and highways. The construction of express highways and freeways to serve expeditiously large volumes of motor vehicle traffic has become a serious problem in many of the more densely populated areas of the United States. The widening of existing routes as well as the adequate development of new routes is frequently delayed by the excessive costs of land acquisition, particularly in highly developed areas.

An important part of the right-of-way problem is the acquisition or control of land outside the immediate boundaries of a given improvement. Such acquisition is generally desirable from the standpoints of appearance, safety, economy, and the general public welfare. The taking of additional land may also facilitate the future de-

velopment of a highway, particularly where widening may become necessary because of increased traffic. It has also been suggested that since increased property values often accompany a public improvement, measures should be taken to conserve this unearned increment to the public so as to defray in part the cost of the improvement. The conservation of these increased values may be accomplished through acquisition of excess land at the time of the improvement with subsequent resale after its completion. The acquisition of these excess lands either for marginal control or recoupment is commonly referred to as "excess condemnation."

The individual elements of "excess condemnation," namely, the necessity of marginal land* acquisition for adequate highway development, the varying possibilities and inherent limitations of recoupment acquisition, the increment tax and special assessments, and the analysis of increment and its relation to recoupment, have been made the subject of the present study.

Considerable thought should be given to the various methods of acquiring land so that maximum usefulness and utility, together with provision for future needs, may be obtained from any given improvement. This article has attempted to show, by distinguishing between marginal and recoupment acquisition, the effect of various procedures which may be followed in land acquisition and their advantages and limitations, as well as to show means by which the public may conserve for itself any increment in property values resulting from the improvement.

A consistent policy of marginal land acquisition may be effective: (1) In solving the economic and general community problem of handling land remnants created as a result of street or highway improvement; (2) in eliminating or reducing consequential damages; (3) in preventing excessive damage costs in present and future development; (4) in conserving property values and protecting public improvements; (5) in avoiding traffic hazards; and (6) in facilitating the conversion of main through routes into freeways.

Recoupment may be realized through the sale or lease of incidentally acquired property or the sale or lease of property specifically acquired under public land funds or authority. While recoupment acquisition when used in connection with the power of eminent domain may actually result in lowered costs for the improvement, such acquisitions should not be used indiscriminately since the success of the method depends upon the extent of the condemnation, the number of parcels involved, and the nature of the improvement.

Although several States have constitutional authority which permits them to acquire excess lands under the power of eminent domain, and a number of States have statutory authority investigations show that this power is being used only to a limited extent.

Up to this time the courts have dealt with the constitutionality of marginal land condemnations under limited conditions presented by specific cases rather than on the basis of the broad principles involved.

The increment tax and special assessments are other methods by which governmental agencies may recover part of the increased values resulting from a street or road improvement. The former has not been used extensively in the United States. Although special assessments are not employed as extensively now as they were 10 years ago, they are still being used in financing many street improvements.

* In this report the term "marginal land" is used to denote land bordering on highway rights-of-way.

Condensed from an article by H. R. Briggs, Field Investigator and Statistician, Division of Control, Public Roads Administration. PUBLIC ROADS, August, 1940.

A SIMPLE METHOD FOR TABULATING TRAFFIC DELAY

By IRVING RIVETT, *Assistant Safety Engineer*

California Division of Highways

THE efficiency of any highway is largely determined by the efficiency of its intersections. Highways which carry a near maximum of traffic or even heavy traffic are greatly reduced in capacity when cross traffic stops the steady flow of vehicles.

When two heavily traveled roads intersect, complete separation of traffic by overhead or subway is frequently the only answer. On other roads traffic signals or stop signs may be used.

An important determining factor is the volume of traffic delay at the intersection. If traffic delay can be accurately obtained, and warrants for the establishment of the several types of intersection control determined, the appropriate answer will be more readily found. Furthermore, accurate knowledge of traffic delay on the several legs of a signal controlled intersection is factual data required for the proper setting of automatic signals. In short, intersection efficiency can be best promoted through accurate knowledge of the actual volume of delay.

Many methods have been used to tabulate delays. With stop watches and observers fair samples have been obtained. Various types of registers have been used and in some instances complicated machines have been constructed.

In all cases, thus far, the results have been far from accurate—or have been but a small sample—and to obtain a degree of accuracy by taking a large sample a young army of observers has been needed.

A simple method of recording traffic delay has been recently devised by the author who, not long ago was being disturbed by the constant hum of a motor-driven automatic calculator. The impact of the steady click-click-click of the cog wheels finally made the impression of constant speed. Constant speed visualized a tabulating stop watch—a stop watch which could be varied as to the units accumulating. A delay tabulator!

The small motor-driven Monroe calculator used by the writer for this purpose has a motor drive which turns over the cumulators at a speed of three hundred sixty revolutions per minute. In other words, if the unit "1" is depressed and the plus bar held down, the cumulators will show a total of 360 at the end of one minute. By simple calculation, then, each unit equals one-sixth of a second.

To determine the applicability of such a device in calculating delays a Monroe calculator was set up at a signal controlled intersection, the stop watch was started and the plus bar of the calculator held down. As the first car stopped at the intersection, the observer pressed down the "1" in the unit column; another car stopped, the "2" was pressed down which automatically released the "1"; for the third car, the number "3" was depressed. As the signal changed and the first car moved out, the number "2" was depressed, indicating the number of cars still delayed. When the second car started, key "1" was pressed, and as the last car moved on, the red clearance button was struck. At the end of thirty seconds the plus

Motor driven calculators in use in making traffic delay study.

bar was released and the total in the cumulator dials taken. Cumulator dials indicated 210 delay units; the stop watch read thirty seconds; there were three cars involved. Since each delay unit equalled one-sixth of a second, three cars had been delayed a total of thirty-five seconds, or eleven and two-thirds seconds per car awaiting the change of signals.

The machine was next used to record delay in both directions on the through street for a fifteen minute period, recording the number of cars on a hand register. The total delay and delay per car were readily established.

As a next step, the right-hand columns were used for delay on the through street, on the far left columns for the cross street. At the end of the period the accumulated delay is taken off in "delay units," one total for the cross street on the left separated by a string of zeros from the total for the through street on the right. Hand tallies are used to register the number of cars. With this method the total delay and the delay per car on both the through street and the cross street are easily obtained. Furthermore, the process is so simple that one man can count five hundred cars per hour.

This method of tabulating traffic delays was developed in March of this year. Immediately the method was put into use for timing intersection signals so as to equalize or efficiently adjust traffic delays. At the present time the Division of Highways of California is using this method in making an intensive study of traffic delay at a number of intersections of heavy traffic. Such accurate factual data will lend much to the solution of intersectional problems.

REPORT OF ARBA PROBLEM COMMITTEE ON ANALYSIS OF ACCIDENT DATA

WILBUR S. SMITH, *Chairman*

TWO earlier reports of this committee have shown that a large percentage of motor vehicle accidents must be attributed to road building or road maintenance policies, as the correction of hazardous conditions at the locations studied either entirely eliminated or materially reduced the number of accidents. It was further demonstrated in these reports that even though the statistical analyses of most cities and states reveal that the roadway itself is the primary cause of but few accidents (2% to 5%) it is often a contributing factor in a large proportion (approximately 20%).

The primary purpose of the current report is to promote, by discussion and examples, the idea of promulgating further study of several subjects which arise from the analysis of accident data, which need more serious and detailed consideration by road builders and highway engineers. The interest of the committee is to sponsor the use of accident data by road builders to provide a factual engineering approach to our highway deficiency problems.

Accident Records Necessary

Only eight states do not require the reporting of motor vehicle accidents to some central enforcement or administrative agency. This indicates that the necessity for compulsory accident reporting is becoming generally recognized, and that in view of the large amounts being spent annually for accident prevention a substantial investment for collecting and analyzing accident facts is justified. It is the belief of this committee, however, that:

1. Too many local and state agencies use accident records primarily for the mere accumulation of statistics.
2. Cooperation and mutual assistance between the various agencies (engineering, enforcement, and educational) needing information furnished by the reports is lacking in many instances.
3. Most highway departments and municipal engineering divisions are planning and constructing transportation facilities without the proper regard for past accident experiences. This is especially true with respect to short sight distances, narrow bridges, and unsuitable intersections.
4. Many plans for correcting existing hazards are not based on accident facts.
5. A treatment which appears excellent under one set of conditions may prove to be unsuitable elsewhere.

Factors Needing Attention

1. *Allocation of Funds.* In reviewing the construction programs of state highway departments for the past few years it is readily revealed that, in many cases, no—or little—consideration has been given to the allotment of funds for the elimination of hazards and correction of deficiencies as revealed by accident records. For example, the proportion of expenditures for railroad grade crossing protection in most states is entirely out of line with expenditures for protection of pedestrians in rural areas, giving due consideration to the number killed in each instance. There is a definite need for a more detailed study of accident

records before funds are allocated if we are to spend our monies where they will accomplish the most good.

2. *Director of Highway Research.* In a majority of the states the time is arriving when extensive mileages of early pavements constructed with initial large-scale road building bond issues are wearing out.

"One of the handicaps under which road builders have labored during the period of development of the motor vehicle is that they must expect the roads they build to outlast the vehicles that exist at the time of their building. There is a substantial mileage of road pavement still in use that was built 25 years ago or longer, serving today kinds of vehicles that were undreamed of when they were built. Small wonder if such pavements, designed to be used by vehicles capable of a top speed of 30 miles an hour, are found somewhat inadequate for the service of vehicles that may be, and are frequently, driven at speeds above 60 miles an hour."*

In numerous instances the failure of the pavements is reflected most by slippery surfaces and bad alignments. It is not always economically feasible to junk such roads in favor of new ones of modern design, therefore, research directed at the correction of common accident-inducive conditions should be strongly considered.

3. *Increase In One Type of Accident After Correction to Eliminate Another.* Frequently expensive structures are planned and built to eliminate an accident sore spot. In practically every case the plans assure the elimination of the particular type of accident which called attention to the hazard, but there are a number of cases in which the research is not sufficiently thorough to show the likelihood of increasing accidents of another type, by overlooking certain design and construction details.

4. *Considerations in Accident Analysis.* There is obviously a lack of agreement among highway engineers and road builders as to the importance of accident data in design and construction. Highway departments should strive, however, to build up a complete set of statistical records which, when properly coded and tabulated, will afford an invaluable means for determining where new construction is needed and what type of accidents must be eliminated.

Frequently investigations of accident data are not sufficiently detailed. It is generally known, for example, that most accident summaries show that the number of accidents occurring on curves is much less than the number shown occurring on tangents. If the correct procedure is followed, and accidents per mile of curve are compared to accidents per mile of tangent for sections of similar traffic conditions, curves will invariably be found to be much more inducive to mishaps than tangents. Too much emphsais cannot be placed on the necessity for complete study of accident facts before attempts are made to apply or use them.

Pedestrians

In the development of highways and in the establishment of facilities for the convenience and safety of traffic, little thought has been given to the pedestrian. Street and highway improvements usually have been made for the benefit of the motorist. Bridges and underpasses have been constructed even within built-up communities without any sidewalk for the safety of pedestrians. Few traffic signals have been designed or timed for the protection of pedestrians. Suburban sidewalks and crosswalks are notable by their absence.

Motor vehicle accidents resulted in

* "Toll Roads and Free Roads," House Document No. 272, 1939, page 105.

12,500 pedestrian deaths and 257,000 non-fatal pedestrian injuries during 1938, accounting for 39 per cent and 24 per cent, respectively, of the national totals.

Highway engineers and road builders have an opportunity to help meet the need of providing greater protection for the pedestrian. If the facts are properly presented to the people and legislatures, funds for pedestrian protection should be increased.

Conclusions

Based on an analysis of accident data and the facts presented herein, several significant conclusions are drawn:

a. Motor vehicle accident reports provide information essential to the complete and logical redesign of roadways now inducive to accidents, and more complete records are advocated. Lacking adequate diagnosis, choice of a proper treatment occurs only by chance.

b. State highway departments and other road building agencies are urged to use accident data more extensively in determining design, construction, and maintenance policies.

c. Accidents alone justify many extensive highway improvements.

d. Highway research should be directed as indicated by accident records.

e. The roadway is not normally credited with its proper share of causal accident factors. In many more mishaps than is generally believed to be the case, the roadway is quite likely to be a contributing factor.

f. More cooperation will be necessary between the various state and local agencies interested in accident records if such data are to be properly applied.

g. The safer the roads, the more likely it is that additional funds can be derived for building additional roads, due to the more extensive road usage and general user satisfaction.

h. Accident costs often offer a more tangible means of presenting facts than other bases. Public officials are always interested in definite financial appraisals.

i. Only new designs will provide permanent accident reductions at many locations.

j. Accident facts must be employed by road builders to protect pedestrians, especially along rural highways. Pedestrian mishaps are the worst single problem in present day accident consideration.

k. Continued improvement in report forms and summary sheets is recommended to obtain the most accurate facts possible as to the roadway's participation in accidents.

l. Further study of the nature attempted by this committee should reveal important elements relating to road building and accident data.

NOTE: The report contains detailed information on 11 examples where roadway improvements or traffic engineering treatments have resulted in elimination, or reduction of accidents.

The following men are members of Mr. Smith's committee: Leon Aronowitz, James S. Buch, E. F. Copell, Harold F. Hammond (Mem. I.T.E.), R. E. Hefron (Mem. I.T.E.), H. W. Heinrich, Rufus G. Jasper (Mem. I.T.E.), Otto K. Jelinek (Mem. I.T.E.), Harry Neal, Archie B. O'Connor, W. S. Paine, W. F. Rosenwald, (Mem. I.T.E.), C. J. Tilden (Mem. I.T.E.), Arnold H. Vey (Mem. I.T.E.).

Condensed from the report of "Problem Committee on Analysis of Accident Data," Wilbur S. Smith, Chairman, (Mem. I.T.E.); presented at the Annual Convention of the American Road Builders' Association, Chicago, Ill., Jan. 29th-Feb. 2, 1940. Report was published in its entirety in 1940 PROCEEDINGS of the ARBA. Apply to ARBA, National Press Building, Washington, D. C., for copies.

HIGHWAY DESIGN TRENDS IN THE WESTERN STATES

By C. D. VAIL

WHEREAS the early road design was controlled by the requirements of getting traffic "out of the mud," the trends of the past several years have been dictated largely by vehicle speeds and safety requirements. These two factors are so intimately interwoven that it is difficult to consider one without the other.

For balanced design, every critical detail of the highway must be designed, so far as is economically possible for the assumed speed—which is the probable maximum uniform speed of the faster group of drivers. The minimum curve radius for the assumed speed is determined by the standard formula,

$$\text{Radius of Curve (in ft.)} = \frac{0.067V^2}{S + P}$$

where V is the assumed speed in miles per hour. In Colorado, S varies from the normal cross-section crown of, say, 0.02 ft. per ft. of width to 0.1 ft. per ft. of width. In areas subject to excessive ice conditions, the tendency is to reduce the maximum superelevation to 0.075 ft. per ft. of width. For F, Colorado uses a value of 0.16 for speeds of 60 miles an hour or less, with a reduction of 0.005 for each increment of 5 miles an hour above 60 miles an hour.

To facilitate use of these curves at design speeds, spiral transitions are recommended. This refinement is being used in many of the western states and is part of the required design on U. S. Forest highway projects.

Minimum non-passing sight distance, in fact, is determined on the basis of the following formula for stopping distance:

$$\text{Stopping Distance (in ft.)} = 4.4\ V + \frac{V^2}{12}$$

V being the velocity in miles per hour. The first term of this formula allows three seconds for the driver to perceive an object in the roadway and react to the point where brakes begin to decelerate the vehicle, while the second term represents the distance necessary for brakes to stop the vehicle, using a friction coefficient of 0.4. Stopping distances from the various speeds, as determined by this formula, are as follows:

Design Speed	*Stopping Distance*
25 miles per hour	162 lin. ft.
40 miles per hour	309 lin. ft.
60 miles per hour	564 lin. ft.
80 miles per hour	885 lin. ft.
100 miles per hour	1273 lin. ft.

Minimum passing sight distances involve a wide choice of assumptions for traffic behavior. The present trend is to use the sum of the three distances:

1. Distance traversed during perception time.
2. Distance traversed by passing vehicle while passing.
3. Distance traversed by an opposing vehicle during the operation of passing.

For the first item we assume that two cars are traveling in tandem at 10 miles an hour less than the design speed. The opposing traffic lane becomes clear and the driver of the rear car decides to pass. The distance (in ft.) traveled during this perception time is 4.4 $(V—10)$, where V is the design speed (in miles per hour).

For the second item, the distance traversed relative to the passed vehicle plus the distance traversed by the passed vehicle in the same period of time is $2S + 1.47\ (V - 10)\ t$, where S is the spacing between the vehicles at beginning and end of the passing maneuver, and t is the time in seconds required to traverse 2S relative to the slower moving vehicle. S is taken as the braking distance at de-

sign speed, and t is computed therefrom on the basis of an average relative velocity of 10 miles per hour.

For the third item it is assumed that opposing traffic is traveling at the design speed for the highway. The distance traveled by opposing traffic during the passing maneuver is 1.47 $V\ t$.

The minimum passing sight distance then is the sum of the three items, or $4.4\ (V-10) + 2S + 1.47\ (V-10)\ t + 1.47\ Vt$

The distances for the various speeds on the basis of the foregoing assumptions are:

Design Speed	*Required Passing Sight Distance*
30 miles per hour	643 ft.
40 miles per hour	1060 ft.
50 miles per hour	1595 ft.
60 miles per hour	2316 ft.
70 miles per hour	3236 ft.

Where passing sight distance is considered, vehicles are the objects that must be seen. The height of object is assumed to be 4½ ft., the same as for height of eye. The minimum lengths of vertical curves are developed on this basis and are tabulated for use in design.

The width of roadway cross-section required for safe operation has increased as traffic density, vehicle speeds and truck widths have become greater. The trend generally over the entire country now is to use an 11-ft. width per lane of traffic, and some authorities are advocating a 12-ft. lane width where speeds are high and truck traffic is heavy. Using 12-ft. lanes and 8-ft. shoulders, the modern two-lane highway presents a finished width of 40 ft. This crowned width, together with 1-on-6 slopes from shoulders toward ditches, provides an improvement that should serve without congestion for mixed traffic of at least 4,000 vehicles a day.

The Colorado State-Wide Highway Planning Survey recently reported upon the results of a traffic accident study extending over the years 1936, 1937 and 1938. This study indicates the type of remedial measures necessary to reduce the accident frequency.

Upon inspection of the accident trends, one observation is evident: two-vehicle collisions exhibited the greatest accident frequency in all localities. In urban localities two-vehicle collisions made up 76.8% of all accidents; of these 54.8% occurred at intersections, while 45.2% occurred between intersections. In semi-urban localities two-vehicle collisions were 64.2% of all accidents; of these 45.8% occurred at intersections, while 54.2% occurred between intersections. In rural localities two-vehicle collisions constituted 46.8% of all accidents; of these 18.9% occurred at intersections, while 81.1% occurred between intersections.

Design details intended to reduce accidents at intersections include wider rights of way at intersections to increase sight distance; a sufficiently wide median parting strip between opposing lanes to permit turning vehicles to park between lanes until movement can be resumed without endangering other vehicles; and acceleration and deceleration lanes to provide lanes where traffic leaving the main highway can slow down for the turn, or where traffic can enter the highway and gain speed without danger of rear-end collisions. In cases of intersections involving heavy traffic flow on both highways, structures to separate this traffic are considered necessary. Also, the proper stop signs on secondary roads, warning signs, and pavement markings, are part of the requirements for correct intersection design.

Angle parking in urban localities is the largest single contributing factor to two-vehicle collisions. In fact, in comparison with parallel parking, the expectancy of having an accident when backing from the curb in angle parking is better than 2½ to 1 in ur-

ban localities. On the other hand, in semi-urban and rural areas, movements forward and backward from parked positions are negligible in amount, and the ratios are about the same for each of these movements in both localities.

Two vehicles moving in the opposite direction involved in side-swipe crashes increase from 6.5% to 35.0% to 50.3%, or in ratio of 1 to 5½ to 8 in urban, semi-urban, and rural localities, respectively. Head-on collisions in like manner increase from 1.9% to 6.6% to 10.4%, or in the ratio of 1 to 3½ to 5½ in urban, semi-urban, and rural localities, respectively.

Design trends to combat between-intersection accidents include wider traffic lanes, a median parting strip to separate opposing traffic, wide shoulders and flat shoulder slopes, greater sight distance, and easier grades and curvature. Also along the more heavily traveled highways the need for service roads and limited access to the main route is becoming more evident.

The expanding needs of traffic make wide rights of way necessary. More than this, it is imperative that positive control of roadside improvements be exercised to prevent the promiscuous growth of hot-dog stands, beer joints, junk yards, fruit stands, dance halls, and so forth, where their presence would increase hazards to traffic. Many of the states have adopted zoning laws which permit this control, and it is expected that the application of these laws will result not only in a reduction in traffic hazards, but also in the general enhancement of property values along highways.

Condensed from an article by C. D. Vail, State Highway Engineer, Denver, Colorado. CIVIL ENGINEERING, September, 1940, pp. 567-570.

"PROTECTING THE PEDESTRIAN"

By ERNEST H. MILLER

"PROTECTING THE PEDESTRIAN," South Bend's No. 1 Problem in Traffic Safety, is a report made by Ernest H. Miller (Mem. I.T.E.), Traffic Engineer of South Bend, to the City Traffic Commission.

Some of the highlights of this report are: 65.5% of the pedestrian fatalities were persons over 45 years of age; 21.3% of the pedestrian fatalities were persons over 65 years; Persons 65 and over have the highest pedestrian accident rate; Children 5-14 years have the second highest pedestrian accident rate; 56.3% of the accidents between intersections were children; 81.5% of child accidents between intersections were school children; Pedestrians were crossing against the red in 27% of accidents; Pedestrians were crossing with the green in 50% of accidents; Jay walking results in 20% of the accidents downtown; 82% of pedestrian fatalities occurred during dusk and darkness; The highest reported speed in a fatal crash was 40 M.P.H.; Most drivers involved in pedestrian accidents were 25 to 44 years of age.

On page 30 Mr. Miller states: "It is very seldom that the motorist yields the right-of-way to pedestrians when making right and left turns. There are various ways to overcome this conflict between pedestrian walking with the green light, and vehicles turning right and left. Special pedestrian signals to provide a separate interval for pedestrian movement in all directions, during which time all vehicular movement is stopped, overcomes this conflict. The addition of a separate pedestrian interval, however, slows up the entire cycle and is therefore justified only in exceptional cases where there are many vehicular turns combined with heavy pedestrian traffic. Such pedestrian signals generally show the word 'walk' on a dark background. When the signal is dark a similar wait signal is displayed to advise pedestrians not to cross."

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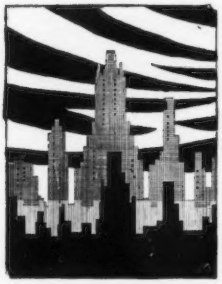

Traffic Engineering NEWS

New Traffic Engineering Divisions

The State Highway Department of North Carolina has just created a new Traffic Engineering Division. Mr. Adolphus Mitchell, who has just completed the course in Traffic Engineering at the Bureau for Street Traffic Research at Yale University is to head the new unit in North Carolina.

Mr. George Papageorge has just returned from the Bureau for Street Traffic Research at Yale University, where he was a Fellow last year, to accept a position as Traffic Engineer in the Department of Traffic and Safety with the Georgia State Highway Department. Mr. Robert D. Dier, who was also a Fellow in the Bureau for Street Traffic Research at Yale last year, is to serve as Mr. Papageorge's assistant.

Philadelphia, Pennsylvania

On August 12th, with the approval of Mayor Lamberton and under the orders of James H. Malone, Director of the Department of Public Safety, the Traffic Engineering Bureau assumed full responsibility for the maintenance of traffic signals. Robert A. Mitchell (Mem. I.T.E.), is the Traffic Engineer and head of the Traffic Engineering Bureau. Eleven men and necessary equipment were transferred on this date from the Electrical Bureau.

Mr. John F. Gallagher (Assoc. I.T.E.) was promoted by the Director from Accident Analysis Engineer to Traffic Signal Engineer, and in this capacity will be assistant to Mr. Mitchell. Mr. Ralph Hafner (Assoc. I.T.E.) was promoted from Traffic Draftsman to Accident Analysis Engineer.

When the Convention is about to Commence what could be more appropriate than

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Monday, October 7, 1940
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Paul G. Hoffman

The Institute takes pleasure in announcing the election of Paul G. Hoffman, President, Automotive Safety Foundation and President, the Studebaker Corporation of America, to Honorary Life Membership.

Mr. Hoffman, one of the nation's outstanding industrial leaders, has devoted a large share of his time during the past 15 or 20 years to a study of the nation's traffic problems. Not only has he become a nationally-known authority on traffic matters but he has given visible expression to his work by his writings and by his energetic and wise administration of the Automotive Safety Foundation.

As the first president of the Los Angeles Traffic Commission, Mr. Hoffman brought to this work the quality of leadership which had made him a phenomenally successful business man and which has since made him equally well known as an outstanding leader in public thought.

In 1925 when he was called to the Vice-Presidency of the Studebaker Corporation, he immediately translated his vision of the need for a scientific attack on the traffic problem into action and founded the Bureau for Street Traffic Research, first in Harvard University and now in Yale University. Believing that organized activity on the part of the entire automotive industry in safety matters was not only a social obligation but, likewise, enlightened good business it was not long before he had encouraged all automobile companies to participate in the activity which he had founded. Thus, came into existence the Automotive Safety Foundation which, in the past five years, has had a profound effect upon the record of accidents and deaths in the United States and upon the economy and efficiency of automotive transportation. His work has had a measurable influence in promoting and encouraging the engineering approach to the traffic problem and his consistent support of this technique has had an important influence upon the position which is today held in the United States by the traffic engineer.

The Institute of Traffic Engineers is proud and happy to welcome Mr. Hoffman to its membership as an Honorary Life Member.

Illinois Traffic Engineering Conference

Illinois will hold a four-day traffic engineering conference the latter part of November or the early part of December through the joint sponsorship of the University of Illinois and the Illinois State Highway Department. Already some 80 state, county and municipal engineers have indicated their intention to attend this intensive conference, which will be held on the University of Illinois campus.

The Advisory Committee making the arrangements for the conference includes Professor C. C. Wiley, University of Illinois; Harry H. Harrison and John L. Towers, Traffic Engineer and Assistant Traffic Engineer respectively, Illinois Division of Highways; and Harold F. Hammond, Director of the Traffic Division of the National Conservation Bureau of New York City. These men are all members of the Institute of Traffic Engineers. Mr. Hammond will serve as co-ordinator of the conference.

News from the Field

George Fisher, district traffic engineer for the Ohio State Highway Department at Middletown, has been awarded a fellowship at Yale University to do work in the Bureau for Street Traffic Research. The course will provide nine months of training.

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Aerial Pictures Replace Field Survey in Planning Detroit Highway

Aerial photographs are replacing the usual field surveys in planning a modern express highway now under design for the city of Detroit, the American Public Works Association reported today. When finished, the photographs, which are taken from a height of 3,000 feet, will be made into a mosaic strip map on a scale of 40 feet to the inch. It will measure 154 feet and will show 14 miles of Grand River Avenue, parallel to which the proposed highway will run.

The Michigan state highway department, in charge of the work, says that the photographs, which were taken in a few days' time at a cost of $800, are an efficient and accurate substitute for work that would cost $8,000 under the usual field surveying methods.

The Michigan highway office first used aerial pictures in 1924 to guide in planning new roads, but the present project is the first one in which they replace field surveys entirely, according to the Association.

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Traffic Engineering Handbook

Fifteen men are preparing material for the TRAFFIC ENGINEERING HANDBOOK, which is being compiled by the Institute of Traffic Engineers in cooperation with the National Conservation Bureau. Some have already put their material into final form or have prepared a draft and will have it completed at the time of the convention. The others have agreed to have an outline available at the convention time.

Harold F. Hammond will present a report on the status of the HANDBOOK at the Business Meeting of the Institute, October 6. Leslie J. Sorenson and Harold F. Hammond, Co-editors, are hopeful of having the draft of the HANDBOOK completed early in November. At that time a Review Committee will be appointed by President Simpson to go over all the material and make the final choice of what will be included in the HANDBOOK. If the present record of progress in preparing material continues, the HANDBOOK should be ready for distribution by the first of the year.

Activities of Members

Lloyd F. Rader (Affil. I.T.E.), formerly Associate Professor of Civil Engineering, Polytechnic Institute of Brooklyn, has accepted a position as Professor of Civil Engineering at the University of Wisconsin, Madison, Wis. Dr. Rader has been a member of the faculty at Polytechnic Institute of Brooklyn for the past twelve years.

Bruce D. Greenshields (Assoc. I.T.E.), has accepted a position as Adjunct Professor of Civil Engineering, Polytechnic Institute of Brooklyn. Professor Greenshields was formerly Associate Professor of Civil Engineering at the College of the City of New York.

Professor Greenshields will also conduct two courses in traffic engineering and highway administration and finance, designed for employees of the public works division of the Park Department, the traffic division of the Police Department and workers in the municipal and state highway departments and engineering offices as a part of the program for training in-service employees of the City.

Recent Publications

PROCEEDINGS of the First Annual Texas Traffic Engineering Conference (July 15-20). Contains more than 150 pages covering major phases of traffic engineering in the South and West. The broad range of subjects includes: Traffic Orientation; Municipal Traffic Problems; Traffic Signal Lights; Parking; Grade Intersection Design; Speed and Speed Zoning; Traffic Conditions in Military Zones; Street and Highway Planning; Public Relations for Engineer; etc.

The PROCEEDINGS are priced at $1.50 and copies may be obtained by writing to John A. Focht, Professor of Highway Engineering, University of Texas, Austin, Texas.

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Dallas, Texas

Highlights of the program thus far relate to the extension and modernization of the signal system; the development of a system of one-way streets in the central business district; the preparation of plans for construction or reconstruction of intersections and other streets improvements; the development of a system of through streets; and various accident studies along accident prone thoroughfares.

Plans have been prepared for traffic control signals at sixteen intersections. Included in this work are two parallel flexible progressive systems involving triple dial-triple reset type of operation. Preliminary plans are also underway for the complete modernization of the downtown signal system, involving approximately eighty-five intersections, so as to provide a grid system for flexible progressive movement.

All future signals in Dallas will be designed for near-right and far-left indications in the direction of each approach, but may be modified at "T" or offset intersections as required to afford the best visibility.

The Traffic Engineering Division, under the direction of Walter H. Klapproth, Traffic Engineer, (Mem. I.T.E.), has prepared for the redesign of a number of irregular and offset intersections, and there are now four or five others on hand that are awaiting preparation of plans.

Congestion has been practically eliminated at Cedar Springs and Maple, one of Dallas' worst intersections, by placing into effect the reversible lane type of operation morning and evening on the narrow portion of Cedar Springs Avenue, coupled with certain changes in signal operation.

Upon arriving in Dallas it was observed that there was no system of protected through streets. Such a system is now being developed.

Perhaps the most complicated assignment undertaken is the development of a system of one-way streets in the central business district. The report and recommendations on one-way streets will be ready for Council consideration in September, and will include a complete traffic study of vehicular and fixed wheel traffic, and will also include recommendations pertaining to parking and the modernization and alteration of the signal system to accommodate one-way movement efficiently.

In addition to the foregoing they are now undertaking the analysis of the entire 1939 accident experience with especial attention to pedestrian accidents.

The City Council has just approved a complete reorganization of all services affecting traffic, and has placed them under the supervision of the Traffic Engineer. This includes complete jurisdiction over the traffic control system, parking meters, the fire alarm system, street marking and signing. Organization of the Traffic Engineering Division will occupy much of Mr. Klapproth's time during the next few months.

W.P.A. to Build Defense Highways

Works Projects Administration of the Public Works Agency announced August 22 that the W.P.A. program of the coming months will emphasize the improvement of roads of strategic military importance. The work, it was said, will be done largely in cooperation with and on the recommendation of the Public Roads Administration and the War and Navy Departments. No estimate was made either of the funds available for defense highway work or the amount of employment it will provide.

The Public Roads Administration has requested highway departments in the various states to submit estimates of the probable cost of bringing up to military standards the highways in their particular states that are included in the strategic military system as laid out by the War Department.

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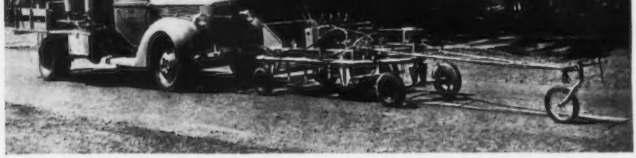

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American Highways—a Bulwark of National Defense

ON September 28th, there came to your editor's attention a plan for arterial highways which had been placed upon President Roosevelt's desk, and of which its proponents say may one day save America from invasion.

This plan proposes 24-foot widths for major roads, shoulders 10 feet wide, alternate right and left parking spaces 2,000 feet long at two mile intervals, auxiliary roads paralleling heavy-duty military routes and flight strips for aircraft contact with moving units.

The plan is the work of military and civil authorities and calls for an immediate start by Federal and State governments on a vast program to prepare 75,000 miles of existing key-roads, and 1,800 bridges for mass movement of great mechanized troop units and supplies at top speed.

It is certain that American highways as a bulwark of national defense, are of the greatest importance, particularly during times like these. In fact, the nation's future existence as a democracy might depend largely on the soundness and practicability of these new national defense highway programs.

Our military experts tell us that the strengthening of all weak links in the strategic system is most important in preventing delay in preparation for defense and that should defense become necessary any considerable number of weak links might lead to disastrous consequences.

An example from which we might profit well is the difficulty that England is having today. Not only is the disaster of air bombings and the constant threat of invasion one of the major headaches of London, but the problem of highway congestion is today proving itself one of their greatest stumbling blocks.

From England we must profit and see that no similar experience happens here.

Officials have stated that the future arteries of cross-country traffic proposed to the President would outstrip the efficiency of Nazi Germany's vaunted "autobahnen" over which Hitler's legions roared to lightning victory during the central European blitzkrieg.

Work that state highway departments have planned to spread over a period of years must now be undertaken and finished as soon as possible. An attack on this country is considered most unlikely if we are moderately well prepared to meet it, and certainly American highways are one of the most important bulwarks for our national defense.

Laurence B. Tipton

Editor, Traffic Engineering

TRAFFIC CHANNELIZATION METHODS

By GUY KELCEY

THE shortest time between two points requires uninterrupted motion. Thus a driver will normally reach his goal faster at a uniform moderate speed, continuously maintained, than by an interrupted, high-speed "dash—slow down—dash—stop—dash" progression. Uniform continuity of motion, upon which greatest efficiency of traffic flow depends, requires order. Safety also is corollary to and dependent upon order. The establishment of conditions to this end, and to which drivers will respond naturally, is the primary purpose of channelization.

Having determined upon the best organization of traffic flow (See "Channelization of Motor Traffic," PROCEEDINGS, American Society of Civil Engineers, December 1939), means must be applied to make the plan effective and particularly to limit straying of adventuring drivers. Success depends upon adherence to a number of traffic principles. Of particular importance is the fact that drivers choose natural, easy paths and avoid those that appear difficult. Therefore, right courses must be made easy and wrong ones hard, or to appear hard. Desired results are then automatic.

Right courses are channeled and made easy and wrong ones blocked and made uninviting by the use of islands, dividing strips, fins, curbs and other means of separation. At one end of the list is the painted line and at the other are the physical barriers that partially or wholly obstruct wrong movements.

The effect of a barrier may be in its physical character, its annoyance or illusion value, or in the motorist's fear of accident or punishment, or a combination of these. A low curbing or other treatment that bars vehicles at high speeds may be ineffective at low speeds. However produced, barrier effect must be positive in safeguarding drivers and keeping them in their own proper lanes.

Painted lines and areas, while useful for many purposes are not wholly satisfactory channelizing means unless quite strictly enforced. Paint must usually be supplemented by fear of punishment because it has no physical, and only limited moral, restraining influence. Painted lines and areas are, however, useful in supplementing other channelizing means.

One type of island, made with paving block or brick, in conspicuous color contrast to surrounding pavement, starts at pavement level and rises gradually to a height of 6 in. or more at the center. The rise may also be in irregular steps to give the appearance of rough cobble. The resulting barrier aspect, due to color difference and rough surface, is effective.

To channelize roadways of limited width requires the use of quite narrow fins or special separator devices with quite positive barrier value. On many of these roadways a single collision of two vehicles moving in opposite directions at a time of peak load would result not only in a succession of accidents but in a traffic jam that would spread out in all directions from the focal point. The Chicago Park District's cable-type divider is flexible, is reported not to throw colliding cars out of control, and aids drainage. Another similar treatment employs guard-rail plates placed back to back. One section of Chicago's Outer Drive is equipped with fins that are raised or lowered to adjust roadway width to favor directional movements under conditions of heavy flow. This treatment essentially provides two more lanes, for which demand exists but

for which additional land cannot possibly be secured.

A traffic island, dividing strip, or other channelizing means, when it is correctly designed and located, acts as an aid rather than an interference or obstruction to traffic that is moving properly.

There are two general types of channelizing means. One discourages, to varying degrees, but does not absolutely restrain, vehicles tending to get out of their proper channels. The other protects persons, property, structures, or other traffic in areas from which vehicles must definitely be excluded. Properly designed barriers of the first type do little or no harm to drivers who run over them. Barriers of the second type, however, are absolute and present a limit-of-passage obstacle. It is easy to conclude that drivers who collide with such major barriers, properly designed, placed, and safe-guarded, are drunk, careless, or reckless—and about all such drivers are—but if it is possible to protect them as well as the persons and property exposed to the consequences of their bad driving, it must be done.

When cars approach an object or a hole in the roadway they swing out to avoid it. On the traffic approach end, the area of unused pavement with few wheel marks has gradually curving sides, and will increase in length with the speed of traffic. Traffic approach ends of exposed islands, parkway strips, and other similar installations should be shaped to conform to this natural sweep of vehicles. Then a driver who misjudges his leeway or is forced into an island, will strike its naturally curved sides a glancing blow and be deflected with little or no damage and without losing control. Approach ends are sloped on the right side when cars pass only to the right, or on both sides if cars operate also to the left.

An interesting design for safety zones was first used in Kansas City, Mo., by Tom Seburn, the city's traffic engineer. This design (conceived by Miller McClintock, director, and Theodore Matson, research associate, Traffic Research Bureau, Yale University) provides means by which a colliding vehicle, when not deflected, is intercepted and stopped with little or no damage up to speeds, it is claimed, of 45 miles an hour, and with reduced damage at higher speeds. This is accomplished by providing, in addition to gradually curved sides by which vehicles are normally deflected, an inclined end or prow on which the front axle of a vehicle rides up the gradual slope and, by frictional resistance, reduces the speed to or approaching zero before impact with a buffer or abutment.

It is necessary to safeguard traffic islands, and other structures in pavement areas by making them clearly visible to approaching drivers, both in daylight and at night, from such distances that there will be no confusion or difficulty. This is not enough, however. All traffic signals and signs, particularly treatments by which traffic islands are safeguarded, must be designed with due regard for optical illusion, which is an unsuspected but major cause of many accidents. When observed after dark, many objects, such as lights, signals, signs, traffic islands and dividing strips, may give drivers the illusion of false distances. Judgment of distance requires the observer to estimate the dimensions and proportions of objects ahead. Therefore it is necessary that lights or other markings, by which an island or obstruction is safeguarded, be of a known and easily recognized size or spacing, or that they illuminate and define something of known proportions. Otherwise distance cannot be judged definitely, and the estimates of different observers as to the distance to a given object will differ widely. Many channelizing treatments invite acci-

dents because the problem of optical illusion is overlooked or ignored, causing drivers to misjudge distances. Painted lines which swing gradually around a traffic island or an obstruction in the roadway, so that traffic is swept clear, aid in correcting these illusions.

Vehicles entering an intersection, past an island, need only a normal width of lane. However, vehicles turning left or right out of an intersection of narrow roadways, past an island, need more room, and to favor them channelizing islands in narrow roadways should be offset. When the intersected roadway is also narrow, an island placed on its curb line may too greatly limit the radius of left-turn movements of vehicles both leaving and entering the intersection. Longer turning radii may be provided by moving the island back the needed extra distance from the curb line. Thus by offsetting, to favor vehicles leaving the intersection, and dropping back, if necessary, to accommodate left-turning vehicles both leaving and entering, handicaps of limited roadway width are overcome. Under some traffic conditions, in built-up communities, channelizing islands will be found helpful where intersecting roadways are as narrow as 30 ft. Parking limitations must be imposed to suit needs of the installation. It is desirable, of course, that one of the intersecting roadways, and if possible both, be wider than this, although some useful island installations have been made in roadways of even less width.

When vehicles moving in the same direction in adjacent lanes converge into a single lane, they are said to merge. Merging is accomplished with greatest efficiency and least confusion or turbulence when converging angles are relatively flat and relative speeds approximately equal. On high-speed or heavily loaded roadways, therefore, acceleration lanes are desirable on which entering vehicles may be shielded from the main flow until ready to merge with it. Short acceleration lanes are helpful, but if possible such lanes should be long enough to permit merging drivers easily to attain the speed of the main flow. By converging on a flat angle, through a sufficient distance, they can see the main-flow vehicles and exercise accurate judgments in merging with them at the proper moment. For vehicles departing from a main movement, deceleration lanes must often be provided so that, without interference to the main flow, drivers may drop out and slow down to speeds necessary for executing turn-off maneuvers.

Length requirements for acceleration and deceleration lanes vary both on tangents and on circles. They depend upon front and rear sight distances, normal speeds and differences of speed, and physical conditions. Lengths of 350 ft. or more are desirable although much shorter distances may be and are used. The Pennsylvania Turnpike, designed for high speed, has acceleration and deceleration lanes 1,200 ft. long for easy merging and for deceleration at exits, on engine compression, without the use of brakes.

To encourage proper use of such lanes, their pavement should, where possible, contrast in color with the adjacent main roadway. On tangents, this makes these lanes uninviting to the faster moving drivers on the main roadway, for whom they are not intended.

This principle of acceleration and lanes is applied to traffic circles by extending the deflector islands into the area of the circle to a depth of from half to a full lane, thus shielding entering and departing movements.

Condensed from an article by Guy Kelcey, Sales Manager, Signal Service Corp., (Mem. I.T.E.). CIVIL ENGINEERING, October, 1940, pp. 645-648.

BEARING DOWN ON THE TROUBLE SPOTS

By F. M. KREML

THE traffic divisions of most municipal police departments are under-manned. There are insufficient policemen to patrol adequately all the streets and highways within their jurisdictions. Because of this, traffic division commanders find that maximum effectiveness can be obtained through the assignment of patrol officers to places where accidents have been occurring, when they have been occurring, with specific instructions as to the type of violations which caused the accidents.

That, in brief, is selective enforcement, a police technique by which automobilie accidents can be reduced in any community, large or small.

Selective enforcement is no cure-all for traffic ills. Rather, it is an efficient, practicable method of reducing automobile accidents. It has proved itself in scores of cities throughout the United States.

The entire program of selective enforcement is founded upon a complete system of traffic accident records gathered by the investigation squads and analyzed by the headquarters staff. Accident report cards, filed according to accident location, must tell where, when and how accidents occurred. From these report cards are prepared monthly spot maps of the city, with accidents designated by different colored pins according to time, place and type of violation.

A study of these spot maps gives the trained traffic officer a complete picture of the city's accident experience. The map of one month forms the basis of the enforcement program of the next, so that enforcement follows accidents the year around and all over the city. An intersection or an area which has a bad experience one month will receive a great deal of attention the next, and so on.

The dependence of a selective enforcement program upon complete traffic accident records is immediately evident. If there are no records as to time, place and type of violations, then obviously it is impossible to concentrate the necessary man-power in the areas experiencing numerous accidents. With those facts, the patrolmen constitute a mobile unit which can be maneuvered about the city as necessity demands.

In one mid-western city it was found that 50 per cent of all smash-ups, fatal as well as non-fatal, occurred between 4 o'clock in the afternoon and midnight. *But 80 per cent of the traffic force went off duty by 4 P. M.!*

In the same city it was found that 80 per cent of the arrests for all types of traffic violations were being made on boulevards and through-streets. *But 70 per cent of the fatalities were occurring in one-quarter of the city, not on boulevards or through-streets.*

In another city—and this is true of many—motorcycle police were assigned exclusively to principal arteries of travel. *But only 21 per cent of all accidents were occurring on those main arteries. Elimination of every accident from those ways would have resulted in a reduction of only one-fifth of the city's total.*

Obviously, the time and place assignments of patrolmen were wrong in both cities. No attempt was made to post available man-power in those areas *where* they would do the most good *when* they would do the most good. Traffic policing was haphazard

at best, planned without regard to necessity and executed with a minimum of results.

Selective enforcement, intelligently administered, *anticipates* accidents, thus preventing their occurence. It cannot eliminate all accidents, because the ever-present human element precludes that possibility. It does, however, prove conclusively that traffic death rates can, to a heartening degree, be controlled by proper enforcement practices.

It must, however, be emphasized that selectivity alone will not guarantee a sound program of enforcement. There are other equally important elements, without which selectivity would be ineffective and practically impossible.

The other elements necessary to a sound enforcement program are:

1. Proper organization and adequate personnell to insure a thorough and flexible attack on the accident problem.
2. Proper training of personnel.
3. Proper administration of the program.
4. An adequate amount of enforcement to insure maximum results.
5. Cooperation of the courts to insure adequate conviction rates and appropriate penalties.
6. Enforcement policies which combine reasonableness and effectiveness to a proper degree.

It must be remembered, too, that traffic safety is dependent upon more than one factor. Just as enforcement is greater than selectivity alone, so is the field of traffic safety greater than enforcement. The other two E's—education and engineering—are equally important.

Enforcement alone will not solve the traffic problem. Nor will education or engineering do the job unassisted. A well-planned, ably administered program embodying all three elements will secure the greatest possible results for any community actively engaged in the prevention of accidents and the resultant saving of lives.

Condensed from an article by F. M. Kreml, Director, Northwestern University Traffic Institute, (Affil. I.T.E.). AMERICAN CITY, October, 1940, pp. 95, 97.

UNIFORMITY IS THE ANSWER

By CLAUD R. MCCAMMENT

TRAFFIC signs act not only as guides but as eyes for the driving public, especially after nightfall. Thus the driving public depends on uniform, properly placed signs on our highways to guide it safely to its destination.

But to be effective these guides must be uniform. This was the purpose of the Kansas law enacted in 1937, which reads in part as follows:

"The State Highway Commission shall adopt a manual and specifications for a uniform system of traffic control devices for use upon highways within this state. Such uniform system shall correlate with and as far as possible conform to the system then current as approved by the American Association of State Highway Officials."

We had the manual on uniform traffic control devices issued by the A.A.S.H.O. to adhere to so far as basic principles were concerned. But there remained the necessity of selecting signs best adapted to fit the particular

needs of a state whose eastern section is as intensely industrial as its western portion is agricultural.

In the east the horizontal and vertical alignment of roads, heavy traffic and lack of sight distance presented one type of problem. In the west the rolling prairies, ranges of hills and illimitable sight distances presented another.

A copy of the manual was mailed to each mayor, city clerk, police chief and county engineer in the state.

Several cities had the center-over-hanging type of traffic control signal, contrary to our manual, which states that signal faces shall be located to give vehicular traffic on each approach a control indication from the far right-hand corner of the intersection.

In many cases the offending signals were removed at once and replaced with the recommended types. In a few cases, especially in the larger cities, we found that the city did not have the necessary funds to effect the changes at that time. But as the money became available the signals were replaced as directed. All cities agreed that future installations of traffic signals would be placed according to instructions in the manual.

Our standards for installation of traffic control signals follow the manual of the A.A.S.H.O. literally. We do not, however, adhere strictly to the minimum vehicular volume standards, as we feel they are a little too rigid for traffic conditions in our part of the country.

In our manual are incorporated two signs especially designed for the protection of school children attending schools located on highways. One is a portable 24-inch octagonal stop sign to be used in conjunction with a crosswalk and to be placed in the center of the highway and kept there during the time children are actually crossing. The other is a 15-mile-per-hour diamond-shaped sign to be used where it is felt that a stop is not warranted because of ample sight distance. The sign is used for the same purpose.

The State Highway Commission approved a type of no-passing zone already being used by some other states. This consists of four-inch parallel lines painted on the surface of the road a distance of two inches from the center line. On concrete and bituminous surfaces these lines are red, and on brick surfaces they are white. Traffic is warned not to cross the line in its lane by means of a 20 x 36-inch rectangular sign bearing the legend: "Do not cross (red or white) line in your lane."

Speed zones are covered in the manual and a number of such zones were established on highways adjacent to larger cities and in other congested and accident-proven areas. A rather extensive engineering survey is made in each case in which the average speed of 1,500 local cars is ascertained either by means of an Eno speed detector or by an electrical hookup making use of rubber hose switches.

The limit of speed traveled by 75 to 85 per cent of the local cars then is computed and forms a basis for further speed studies. This is combined with a study of existing accident records and hazardous conditions to give the needed information for the zoned or safe speed.

It was found that by reflectorizing all warning and stop signs, night accidents are reduced materially. Larger highway signs are now being used to give special warning to motorists at extremely hazardous points. Reflectorized speed signs denoting the safe speeds for curves are being placed under existing curve signs as rapidly as possible.

Too much praise cannot be given a uniform system of traffic control devices.

Condensed from an article by Claud R. McCamment, State Safety Engineer, State Highway Commission, Kansas. PUBLIC SAFETY, October, 1940, pp. 20, 21.

PARKING METER REVENUE FOR ACCIDENT PREVENTION

By JAMES W. ASTON

FOUR years of parking-meter experience have paid Dallas dividends in the saving of life and property that far exceed the early optimism of local traffic-safety enthusiasts.

Parking meters were first installed in Dallas during the latter part of 1935, and the beginning of the following year we were able to see that their future revenue would justify and sustain a planned program of traffic-accident prevention. During 1935, there were 1,459 persons injured in Dallas traffic mishaps, many of whom were crippled for life, and 50 were killed outright. During the ensuing years, 1936 through 1939, the injured list was cut to the yearly average of 907, and deaths were reduced to 37 per annum.

Accident prevention, as it should be made to function, is not a matter for petty fund consideration. It takes thousands of dollars annually to perform even the fundamentals of a constructive program, which must be kept growing as well as going. Anticipated parking-meter revenue allowed us to provide for this future expense.

Parking meters have produced approximately $114,000 annually in Dallas. This additional income supplied the investment later responsible for the dividends which we now enjoy. We are confident that these funds have been spent wisely, because they have provided Dallas with:

1. An increased personnel of 53 patrolmen and motorcycle officers in the traffic division of our Police Department, the annual cost of which is $98,580, and an appropriation of some $2,600 each year in squad cars and motorcycles. These two vehicles have figured prominently in our strict and selective traffic-enforcement program during the last four years.

2. A full-time traffic engineer, whose services have become indispensable in the prevention of motor-vehicle accidents locally. The engineer operates on an official budget of some $7,000, and to provide him with physical facilities to carry out his objectives, parking-meter revenues have furnished an additional $10,000 for modernizing our traffic-signal system.

3. A director of traffic education and an office secretary, who spend full time popularizing and publicizing traffic safety in Dallas. Theirs is the job of crystallizing public sentiment. An annual expense of approximately $7,000 pays their salaries and provides literature, posters, screen shorts, and other advertising aids.

Our capital outlay for parking meters has averaged $19,466 a year. Maintenance, including salaries for parking-meter collectors and mechanics and for parts and replacements, amounts to approximately $7,000 yearly. The "profit" realized, deducting the two amounts just mentioned, is spent each year in our accident-prevention program only after careful consideration and expert planning to the best of our ability.

Business men, local residents and visitors alike, are well sold on the improvement of parking conditions in Dallas since meters have been in operation, plus the added protection they pay for.

An article by James W. Aston, City Manager, Dallas, Texas. AMERICAN CITY, October, 1940, p. 13.

KEEP TODAY'S TRAFFIC MOVING

By MERWYN A. KRAFT

"*. . . the real problem is that of transportation — in other words the safe and rapid movement of persons and merchandise. Accidents are one index of inefficiency and congestion is another.*" This was said at the 1940 Annual Convention of the American Road Builders' Association following a reference to the city street as "without doubt the weakest link in highway systems today."

This is the "real problem" facing all city officials responsible for handling traffic. The people of *today* should not have to wait until the artists' conceptions of super-highways and skyway systems reach practical fulfillment in the City of the Future and the Highways of Tomorrow.

The following observed examples illustrate the fact that *anything done to facilitate the movement of mass transportation or transit vehicles will correspondingly facilitate the collective movement of all other vehicular traffic,* with resulting service to the best interests of the community. (Two of the four examples given by Mr. Kraft are noted here).

1. *The Case:* Motor-buses are not allowed any curb space for loading and unloading within the central business district, although they carry a large proportion of all persons entering and leaving the district. Furthermore, parking is permitted along curbs immediately adjacent to all crosswalk areas.

The Problem: Buses effectively halt all movement of vehicular traffic in two of the available four moving traffic lanes on the main business and shopping street where buses may be called upon to stop. Automobiles and trucks parked along the curb next to all pedestrian crosswalks force the buses to load and discharge passengers within these crosswalk areas. This parking practice also creates hazards for the heavy pedestrian flows by blocking the vision of vehicle operators as they approach.

The Answer: The city authorities should allot adequate curb space—at least 80 feet for one bus and 115 feet for two buses—back from the crosswalk on the near sides of the intersections. The zones should be marked accurately and clearly by signs and by distinctive curb paint markings. Furthermore, these bus stop zones should be kept clear of all other vehicular traffic, especially during peak-load periods, and a prohibition of parking for a distance of 30 feet from the crosswalk areas on the far side of all intersections should be enforced rigidly.

The Result: Buses will be able to pull completely and quickly into the curb and out of the moving lane of traffic when required to load or discharge passengers. Other vehicular traffic will be able to move freely without the present undesirable and unnecessary delays. Also, with the additional free area at the far sides of the intersections, buses will be able to maneuver back into the traffic stream more easily and more safely. Thus, by sacrificing a relatively small proportion of the total curb space which inconveniences only a few individuals, the rapidity and safety of movement is increased greatly for all vehicles, to the benefit of a great majority of persons.

2. *The Case:* Along the main street of the central business district there are eight intersections, six having traffic signals. In addition, five adjacent intersections are signalized so that within the entire district there are eleven intersections where vehicles are subject to traffic signal control. The signals at each intersection have sepa-

rate control boxes. Although operated by synchronous motors, they are not coordinated. The cycles used are as follows: two—40 seconds; two—50 seconds; three—60 seconds; one—80 seconds; three—90 seconds. The distribution of time between the movements at each intersection is based on obsolete volume data and is not in line with current movement distribution.

The Problem: Movement through or within the district without delays at unfavorable traffic signals is purely a matter of chance because of the varied cycle lengths used and the lack of coordinated timing. An extensive check on delays to buses operating through the area showed that, exclusive of stops for loading and discharging passengers, the buses spent more than 12½ per cent of their operating time stopped while waiting for a favorable traffic signal. As 65 per cent of all persons traveling in vehicles with the district are carried in buses, these delays become of considerable importance to the community as well as to the transit company. Furthermore, similar checks of private and commercial vehicle operation gave even higher time losses because of signal delays, these amounting to 20 per cent of operating time through the district.

The Answer: The traffic signals should be retimed and a uniform cycle length used. First, a 60-second cycle should be tried, and then a cycle of 50 seconds. The distribution of intervals for the several movements at each intersection should be changed to conform with present-day volumes per available lane, and the signals should be coordinated to make progressive movement possible.

The Result: Speeds for all vehicular movement could be doubled. Whereas present average over-all speeds of private passenger vehicles are now only 8 to 9 miles per hour, they could be correspondingly, present average speeds for buses of 4 to 5 miles per hour could be improved to 7 or 8 miles per hour through the district. This would be possible not only because stops at unfavorable traffic signals would be almost done away with, but also because other interferences and slowing of normal driving speeds would be reduced appreciably. Likewise, accidents now caused by sudden stops, weaving and traffic accumulations should be greatly reduced.

These examples illustrate actual traffic conditions which can be improved by known corrective measures. Countless examples could be cited. *Present* street traffic conditions can be improved materially by the commonsense application of known remedies. The people of today can be moved rapidly and safely on the streets of today.

Condensed from an article by Merwyn A. Kraft, Accident Prevention Engineer, American Transit Association (Affil. I.T.E.) AMERICAN CITY, September, 1940, pp. 97, 101.

RECORDING DRIVING HABITS ON TAPE

IF while driving along the highway you cross a series of slender black strips laid across the pavement, you then and there do your part towards designing the highways of tomorrow.

Adopting the fundamental principle that the road must fit the traffic, rather than the other way around, highway engineers have enlisted the unconscious cooperation of hundreds of thousands of motorists from Massachusetts to Oregon to record exactly what most drivers make their cars do under any given set of conditions.

Millions of little pen scratches, electrically operated by cars crossing those pavement strips, translate into a complete story of car speed, passing habits, and road "hogging" if any, of a normal number of people under a variety

of conditions.

Width of pavement, sight distances, degrees of road curve, all are to be predetermined for the future on the basis of what drivers' conduct shows they need.

In order to get accurate information on what takes place in a moving stream of traffic, local and federal officials have developed new checking devices which tell more about how motorists drive their cars than the drivers know about themselves.

In overtaking and passing a car ahead, for instance, the average driver looks for a reasonable length of space for the operation, but does he know just how much space he actually utilizes at a given speed

When a car approaches from the opposite direction, the average driver tends to pull over slightly to the edge of his traffic lane—but how much?

When taking curves, some drivers hug the inner edge, and some swing fairly wide—but again how much, and how many perform one operation and how many the other?

These are the questions highway engineers want answered on a large enough scale to take into account a wide variety of road conditions, geographically distributed to include major differences in driving habits.

When the Public Roads Administration, in collaboration with state highway officials launched their nationwide survey of the country's highway needs, an important feature was to set up equipment for checking the volume and behavior of traffic. Special devices were designed for use on existing highways and sample surveys have been conducted in a number of states. Unconscious that his car was breaking the beam of an electric eye or recording its progress on electrical tape laid across the road, many a motorist has left a record of his speed, direction and driving practices in light and heavy traffic.

Here are some findings from studies made in Maryland and Virginia:

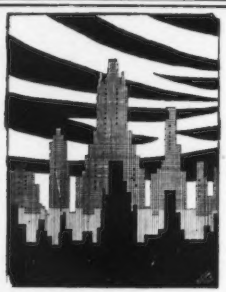
More than four-fifths of all drivers going around slower cars desired to travel less than 16 miles per hour faster than the cars they passed. More than half desired to travel less than 11 m.p.h. faster.

Of all the drivers passing single vehicles, 84 per cent had to slow down before they could start to pass. About one-third had to slow down and stay behind the preceding car until they could see that the road was clear for a sufficient distance ahead to permit them to pass. Slightly more than half had to slow down and wait for an on-coming vehicle to pass before they could start the passing maneuver.

In more than 50 per cent of the passings recorded, the passed vehicle was traveling from 31 to 40 m.p.h.

Incidentally, in one set of studies it was found a surprisingly large number of drivers did not attempt to pass a car ahead when the sight distance was longest, but waited until their own view ahead was reduced. Such data is excellent for studying the average driver's perception of a set of conditions and the judgment time necessary to react.

—*Automobile Facts*



Stop, Look and Listen

Editor's Note:

It is fitting that we devote the following columns to news of those who help and support the Institute of Traffic Engineers.

We STOP to think where they are, we LOOK to see what is happening to them, and we LISTEN for new ideas and opportunities to pass on to them.

Stop

NEW MEMBERS AND TRANSFERS

The Institute of Traffic Engineers welcomes the following new members and congratulates the eight members receiving a transfer in grade of membership:

Name and Address	*Board Action*
Howard M. Baker, Traffic Specialist City Hall Annex Montreal, Canada	Affiliate
E. J. Baumel, Junior Traffic Engineer Chicago Park District Administration Building Burnham Park, Chicago, Illinois	Junior
Stephen E. Butterfield Traffic Engineer Connecticut State Highway Department Hartford, Connecticut	Junior
Fred M. Carter Signing Engineer California State Highway Department Sacramento, California	Member
Edgar F. Copell, Traffic Engineer Commonwealth of Massachusetts 100 Nashua Street Boston, Massachusetts	Member
Wilfred W. Davis Assistant Traffic Engineer State Highway Commission Ames, Iowa	Associate

Name and Address	*Board Action*
Richard J. Diekhaus, Superintendent Maintenance and Construction Traffic Division Department of Streets and Sewers St. Louis, Missouri	Junior
Henry K. Evans Assistant in Traffic Engineering Automobile Club of Southern California Los Angeles, California	Junior
Fred W. Fisch, Director Bureau of Traffic and City Planning City Hall Schenectady, New York	Associate
Theodore W. Forbes, Research Assistant Bureau for Street Traffic Research Yale University New Haven, Connecticut	Affiliate
Edward F. Gervais Traffic Signal Electrician Michigan State Highway Department Lansing, Michigan	Junior
Milton Harris Assistant Safety Engineer California State Highway Department Elks Club, Sacramento, California	Associate
Robert S. Holmes Traffic Division National Conservation Bureau 60 John Street New York, New York	Junior
Lawrence A. Kane Traffic Engineer Old City Hall Gary, Indiana	Associate
Foster M. Kunz Traffic and Safety Engineer Utah State Road Commission Salt Lake City, Utah	Junior
Adolphus Mitchell Traffic Engineer State Highway Commission Raleigh, North Carolina	Junior
Harry E. Neal, Traffic Engineer State Highway Department Columbus, Ohio	Member
Harry L. Powell, Jr. City Traffic Engineer 204 City Hall	Member

Honolulu, T. H.
Giles M. Robertson, Safety Engineer — Associate
Department of Highways
Central Highway Building
Richmond, Virginia

Ross T. Shoaf, Assistant Traffic Engineer — Junior
Bureau of Engineering
Room 286, City Hall
San Francisco, California

Affiliate Membership Nomination

Roy W. Crum, Director — Board invitation to become an Affiliate
Highway Research Board
2101 Constitution Avenue
Washington, D. C.

Transfers

Charles G. Beckenbach — Transfer from Affiliate to Member
Traffic Engineer
City Hall
Cincinnati, Ohio

Lloyd M. Braff — Transfer from Junior to Associate
Assistant Traffic Engineer
Chicago Surface Lines
231 South LaSalle Street
Chicago, Illinois

John J. Dobelek — Transfer from Junior to Associate
District Traffic Engineer
Michigan State Highway Department
Alpena, Michigan

Taylor D. Lewis — Transfer from Junior to Associate
Fort Bragg, North Carolina

Henry W. Osborne, Traffic Engineer — Transfer from Junior to Associate
Superintendent of Engineering Division
Police Department
Flint, Michigan

Ray F. Riegelmeier — Transfer from Associate to Member
Traffic Engineer
Department of Highways
Harrisburg, Pennsylvania

Robert O. Swain — Transfer from Junior to Associate
Assistant Traffic Engineer
Texas State Highway Department
Austin, Texas

Harry E. Stedman, Traffic Engineer — Transfer from Associate to Member
Traffic Engineering Division
East 2nd and Court Avenue
Des Moines, Iowa

Election of Officers

The election of officers of the Institute of Traffic Engineers was held on October 6 in Chicago, Illinois. These officers will serve for the year 1940-1941.

Hawley S. Simpson was re-elected President.

D. Grant Mickle was re-elected Vice-President.

Wm. Graham Cole was elected Secretary-Treasurer.

Harold F. Hammond and *Edward J. O'Meara* were elected to serve on the Board of Direction for two years. They replace John T. Gibala and Walter F. Rosenwald whose terms of office expired.

Look

I. T. E. Holds Eleventh Annual Meeting

The eleventh annual meeting of the Institute of Traffic Engineers was held at the Stevens Hotel in Chicago, October 5th to 8th, 103 members and 87 guests registered at the meeting.

On Saturday morning, October 5th, the chairmen of the standing committees met with President Simpson to plan the meetings of the various committees. These meetings were held on Saturday afternoon and Sunday morning for the purpose of reviewing the year's activities and developing reports for submission to the Institute.

The actual sessions of the Institute's annual meeting started with a business meeting of members on Sunday afternoon. At this time the reports of the standing committees were submitted and discussed and action taken regarding each. The report of the secretary covering the year's activities of the Institute was submitted and approved. The reports of the Nominating Committee and the Committee of Tellers were received and the officers for the ensuing year were elected.

On Monday morning 111 Institute members and guests assembled for a "Biscuit Banter Breakfast"—a social and get-together session presided over by Mr. W. E. DeYoung and Mr. William R. McConochie.

Following the breakfast meeting, the "official bull" session was called to order at 9:45 by President Simpson. The meeting consisted of an informal discussion of various items of interest to traffic engineers, each subject being opened by an Institute member.

On Monday afternoon, the Institute met with the Street and Highway Section of the National Safety Council in a session presided over by Judge Harry H. Porter, Chief Justice of the Municipal Court, Evanston, Illinois, and General Chairman of the Street and Highway Section, N.S.C.

The Tuesday morning session, presided over by Mr. Otto K. Jelinek, Traffic Engineer, Chicago Park District, discussed "Live Problems for Traffic Engineers". The Tuesday afternoon session "New Horizons for Traffic Engineers" was presided over by Mr. Wallace Braun, Traffic Engineer of Baltimore.

The Annual Dinner was held on Tuesday evening, President Simpson acting as Toastmaster. The dinner included both "fact and fancy". The factual part was provided by Mr. H. D. Read, Vice President of the Opinion Research Corporation, who presented an excellent address on "New Developments in Public Opinion Measurements". The "fancy" or fun part of the dinner was provided by the

Resolutions Committee under the leadership of Mr. W. E. DeYoung, which committee after many interruptions by an opposition group of members calling themselves "the farmers", succeeded in unveiling and presenting an unusual and miracle-performing traffic signal device.

Steaming at the Stevens

Traffic Engineers, having solved all the problems in their own field, devoted their recent convention in Chicago (October 5-8) to various phases of Relief. Approximately 35 Farmers, for example, were relieved to find that their invitation to play a major part in the Annual Skit, which each had accepted, was only part of a Resolutions Committee gag, and that it didn't matter that they hadn't learned their lines.

—o—

The Biscuit Banter Breakfast Monday Morning relieved 111 visiting dignitaries of all vestiges of dignity. "Commencement Day at the Institute", the breakfast program, gave Prof. Morrison, Bridegroom Tim Willier, Harold Hammond, and others the doubtful distinction of being spotlighted.

—o—

The 20-odd members who thought they saw scrambled eggs in their mirrors Monday morning permitted the Bun Breakfast to turn in a neat profit. Great things, these advance sales.

—o—

The prominence of Lew McIntyre and Bill Canning in the Farm act at the Banquet led several followers to believe that the farmer's daughter was implicated. In fact, the Institute's Poet Laureate, Hallie Myers, suggested as much. The number of wives who could play the part of the Farmer's Wife, however, leads us to believe the gal has grown up.

QUALITY IS PARAMOUNT

Traffic Signs — like any other merchandise — can be quality built or shoddily made. Miro-Flex signs are built of highest quality, rust-resistant steel, embossed with new standard dies, finished with three coats of best quality baked enamel.

It costs more to take down and refinish shoddily made traffic signs than to install quality signs in the beginning. You'll be surprised how reasonably you can buy Miro-Flex quality signs.

SEND FOR FREE CATALOG

The MIRO-FLEX Co.

1824 E. SECOND ST. WICHITA, KANSAS

Marbelite Better Built Signals

aren't only admired, they're Sold!

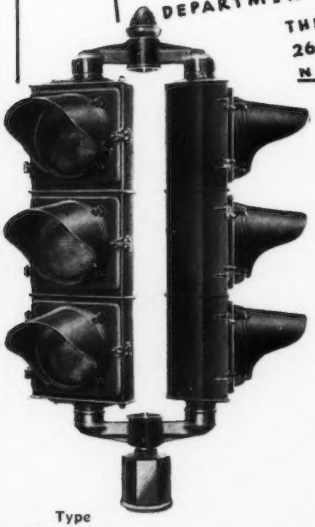
CITY OF NEW YORK
DEPARTMENT OF PURCHASE
PURCHASE ORDER
ORDER NO. 104 REQ. NO. L4 DATE.

OVER 10,000
MARBELITE SIGNALS
SOLD WITHIN 2 YEARS
a few orders - - - -

STATE OF MICHIGAN
STATE ADMINISTRATION BOARD
PURCHASE ORDER
ORDER NO. 5934 REQ. NO. 2336 AUGUST, 1940

CITY OF CLEVELAND
DEPARTMENT OF PURCHASES
PURCHASE ORDER

CITY OF PHILADELPHIA
DEPARTMENT OF PURCHASES AND SUPPLIES
THE MARBELITE CO., INC., ORDER NO. 10738
26 WARREN STREET, REQ. NO. 137
NEW YORK, N.Y.



Type
TRP-223 M
note new aluminum
mounting brackets.

YOU bet they're sold. Throughout the Country Marbelite Signals are winning awards; cities and towns which have used, in past years, different types of Traffic Signals, are changing over to Marbelite.

The reason? Marbelite Traffic Signals are Better-Built; from the very beginning . . . *precision castings . . . waterproof, dustproof construction . . . sealed optical unit hinged permanently to unit's door* . . . to the final assembly of *the new aluminum mounting brackets* . . . all are unbeatable and better-built for long life satisfaction.

Is your City contemplating the installation of new Traffic Signals? If so, why not get in touch with Marbelite and let us try to help out. Surely, you should know more about these Better-Built Signals, especially since many others are going to be installed about the Country.

Send for a catalog.

"BETTER-BUILT TRAFFIC SIGNALS ARE ONLY MADE BY MARBELITE"

THE MARBELITE COMPANY
26 WARREN STREET NEW YORK, N. Y.

Wonder if Paul Green paid for those straw hats and bandannas yet?

If the Member who attended the session will correspond with the Program Committee, he will receive a handsome prize.

—o—

Patent rights have been granted on Martin Bruening's "perfect traffic signal", which was unveiled before an awe struck audience at the Banquet. Prospective buyers should consider that it gives milk, peanuts, sandwiches, and other refreshments. In addition, each signal is adorned with a picture of Prexy Simpson, more suitably framed than we can tell you in this conservative publication. Standard equipment includes a horn, a siren, a whistle, and a coo-coo bird. The bombs demonstrated at the Banquet are extra.

—o—

The Resolutions Committee decided this year that previous Banquets had been too stiff, especially the actors in the Annual Skit. To assure a reasonable degree of articulation this year, the actors were drafted from the audience after the Skit was well underway. Co-stars in the gigantic spectacle were Tracey le May, Tom Seburn, Ken Mackall, and Arch Bollong.

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The Resolutions Committee is prepared to submit evidence that Paul Green registered, which is more than can be said for some of their jokes.

New Applications for Membership

The following applications for admission to membership in the Institute of Traffic Engineers have been received:

M. A. Butcher, Traffic Field Engineer, Nebraska Department of Roads and Irrigation, Lincoln. Applying for admission to junior grade.

F. W. Hurd, Traffic Engineer, Missouri State Highway Department, Jefferson City. Applying for admission to Junior grade.

J. E. Johnston, Traffic Office Engineer, Nebraska Department of Roads and Irrigation, Lincoln. Applying for admission to Junior grade.

W. C. McLendon, Assistant Engineer, State Highway Commission of Wisconsin, Green Bay. Applying for admission to Associate grade.

F. T. Thorpe, District Surveyor and Regulator, Bureau of Engineering Surveys and Zoning, Philadelphia. Applying for admission to Affiliate grade.

J. E. Upham, Field Traffic Investigator, Michigan State Highway Department, Detroit. Applying for admission to Junior grade.

Listen

Board of Direction Meeting

To acquaint the membership more intimately with the activities of the Institute, a brief resume of actions taken by the Board of Direction will hereafter be printed in TRAFFIC ENGINEERING following each Board meeting. The regular Board meetings are held yearly at the time of the Annual Meeting, in December and in May, with special meetings at the call of the President.

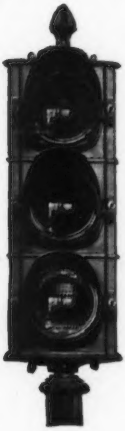
Two Board meetings were held during the convention in Chicago; on Saturday and Sunday, October 5 and 6. The following reviews the action taken at those times.

Membership Applications

Elected to membership:

4 Members
5 Associates
9 Juniors
3 Affiliates

ELECTRIC SIGNALS



Standard signals adapted for all types of mounting. Synchronous and induction control mechanisms and accessory devices.

REFLECTOR SIGNALS

When signs are not enough or expense is a factor, reflector signals keep down both cost and accident rate.

10″ x 18″; Nine 1⅝″ Stimsonites

8″; Six 1⅝″ Stimsonites

15″; Six 3″ Stimsonites

REFLECTOR SIGNS

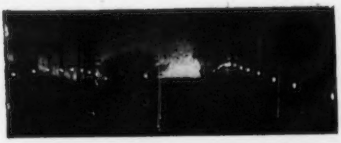
Large Stimsonized and standard reflector button signs for all traffic conditions.

60″ SIGN
18″ LETTERS

24″ SIGN
6″ LETTERS

DELINEATORS

Reflector Delineation gives essential road information after dark at daylight distances. The alignment and driving limits of the road are outlined by a channel of light.



SIGNAL SERVICE CORPORATION

SS SIGNALS

ELIZABETH, N. J.

Transferred:

2 Associates to Member
1 Affiliate to Member
5 Juniors to Associate

Membership Application Procedure

Approval was given to recommendations of the Membership Committee as follows:

1. To require that the five references on the application form must be from men employed by at least three different organizations;

2. To provide for the publishing of names of applicants for admission or transfer in TRAFFIC ENGINEERING.

Financing Expanded Institute Activities

The Board authorized the Policy Subcommittee on Financing to continue negotiations looking to the establishment of an annual sum in the amount of approximately $15,000 to finance broadened Institute activities.

Extension of Cooperative Activities

Approved recommendations of the Policy Subcommittee on Cooperative Activities that the Institute accept invitations received from several national organizations to conduct joint studies relating to traffic engineering.

Traffic Engineering

Recommendations for improvement in the magazine, TRAFFIC ENGINEERING, submitted by the staff, were referred to the President and Secretary for action in the best interests of the Institute.

Standards and Specifications

Approval was given to the Committee's specifications for traffic signal heads, as amended, and it was voted that the standard be mimeographed and distributed to the membership.

President's Award

Approval was given to a proposal that the President and Past Presidents of the Institute establish a President's Award to be made in their discretion to any member of the Institute who in their opinion warranted special recognition for an outstanding contribution to the traffic engineering profession. Expenses in connection with such an award are to be borne wholly by the President and Past Presidents. Awards will be made at the Annual Dinner.

1941 Convention

It was voted to hold the 1941 annual convention at the same time and place as the National Safety Congress.

Resolution to the National Conservation Bureau and Harold Hammond

The Board voted its thanks to the National Conservation Bureau for their valuable assistance during the past five years in furnishing Institute office space, mailing and clerical services, and stenographic assistance, and to the retiring Secretary for his loyal and valuable work on behalf of the Institute.

Other Actions

As a matter of regular practice, the Board considered various other matters having to do with membership, finance, committee activities and similar items, in each case taking action deemed advisable under the circumstances.

Meetings

Twentieth Annual Meeting of the Highway Research Board of the National Research Council, National Academy of Sciences, Washington, D. C., week beginning December 2.

The Annual Convention of the American Trucking Associations will be held at the Biltmore Hotel, Los Angeles, California. John W. Lawrence, Managing Director, November 10-15, 1940.

Fall Meeting of Eastern Conference of Motor Vehicle Administrators (Region 1—AAMVA). Headquarters, Willard Hotel, Washington, D. C. November 14-15, 1940.

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Frankly Speaking

An important job for every traffic engineer

THERE is in the present critical period of American life, one job that every traffic engineer should continually bear in mind.

That job is to promote, on the part of governmental officials—in cities, states, and metropolitan areas—a better understanding for the necessity of traffic engineering in any program of improvement in traffic conditions and the reduction of accidents.

With increasing traffic as a result of a tightened industrial tempo, in large part due to defense production, street and highway accidents and congestion are bound to increase—unless governmental agencies employ every known means to accomplish safe and orderly traffic flow in and between urban centers.

To capitalize on what is being done in the field of traffic engineering education, new traffic departments must be established by those states and cities which are still without a traffic engineer.

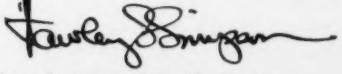
It isn't enough, however, merely to open a new traffic engineering office. The department must have adequate personnel and financing. In no other way will the job be truly attractive to the highest type of traffic engineering ability.

Traffic engineering is not an exact science. It is not the thing that will appeal to the man who likes to explore unknown fields in the cloistered confines of the laboratory. The traffic engineer works in the open. His every task affects intimately every citizen of his community. He must combine in one individual the rare combination of thinker and doer, and the added requirement of personality to carry his plans through to a conclusion.

You don't find these men on every street corner, and you cannot attract these men through mediocre jobs.

What are we, as traffic engineers, with the cooperation of state and city officials, going to do to make the field properly attractive to waiting technical graduates?

Here is our problem? There is no open sesame that will provide the universal answer. Local conditions will dictate the approach that must be made. But we can obtain our objective of a first class traffic engineering department in every state and every city of over 50,000 population if we all will do everything within our power to emphasize publicly at every opportunity what the technique of traffic engineering has already accomplished.



Pres. Institute of Traffic Engineers

MILITARY HIGHWAY MANAGEMENT

By W. S. EVERETT

TWENTY-SIX years ago General Gallieni moved his famous taxicab army from Paris to make the decisive attack against the German right flank which resulted in the great French victory at the Marne. Last spring, however, when terrific traffic jams prevented the French army of 1940 from maneuvering rapidly enough to parry the lightning thrusts of the new German blitzkrieg tactics, the motor vehicle contributed to the downfall of France. Thus it is that the motor vehicle can be either an extremely useful military tool, or one that is capable of leading to the defeat of those who would utilize it.

Formerly it was the railway on which all armies depended for tactical and strategical mobility in campaign. In fact, the railway up to 1940 had always been considered by military experts to form an almost indispensible framework on which all major operations must be based. But recent campaigns in Europe demonstrate that the highway has now largely supplanted the railway as a primary means of transportation during military combat. And there is ample evidence to indicate that in most of their recent successful operations the Germans have entirely cut loose from the railway and that they have made practically no effort to restore railway operation until after the enemy was defeated.

It appears, therefore, on the basis of recent developments in the field of military transportation, that the following conclusions are warranted:

(1) The scientific operation of highways is now as important as has always been the scientific operation of railroads.

(2) Improper or improvised management of highways may result in complete immobiilty and consequent military disaster.

(3) The efficient utilization of highways permits of a flexibility and speed in ground operations which cannot be matched by any other form of transportation.

A satisfactory organization for military highway management outside of the combat zone must obviously begin with the establishment of a single responsible authority at its head. This authority should have full control over highway movements connected with national defense preparations in our current emergency as well as with highway movements in rear of the combat zone during active military operations. Because of the fact that highway movements outside of the actual combat zone must pass through areas under civilian control, it would be desirable that the single agency having jurisdiction over these movements be headed by civilians rather than by War Department personnel. The War Department, of course, could designate liason officers to represent its interests and to arrange for the prompt movement of military personnel or supplies by highway.

Perhaps the most logical agency for highway management on a broad national scale would be a section of a Transportation Committee operating under the present National Defense Advisory Commission. In this case, the head of the Highway Operation Section of the Transportation Committee would be directed to coordinate all forms of highway transportation into a nation-wide network designed to operate harmoniously and effectively in any emergency. One of the most important duties of the Highway Operation Section would be to coordinate detailed plans for the civilian evacuation of threatened areas in the United States. Existing civilian traffic organizations could then be formed into a national highway dispatching agency

equipped to expedite mass highway movements in the same efficient way that the Association of American Railways now handles railway movements. State and municipal police communication nets would be most useful in controlling large highway movements. Local traffic engineers could be utilized to route highway movements and to time them so as to fit in to known civilian traffic flow to best advantage.

The Public Roads Administration through its control over the purse strings of highway construction is already assisting the program of military highway management by eliminating bottlenecks in our national highway system. The various State Legislatures could help by rushing through the enactment of the Uniform Act Regulating traffic on highways, so that driving practices in all states can be standardized. The present regulation of inter-state trucking by the Bureau of Motor Carriers of the Interstate Commerce Commission is one step toward uniformity. Greater uniformity in traffic regulation would materially simplify the training of military drivers and would reduce accidents resulting from lack of understanding of local traffic regulations.

The problem of highway management in the theater of active military operations is one that must be solved primarily by military agencies. There are three principal factors involved: the vehicle, the driver, and the highway. The War Department accordingly has organized its attack on the problem along these three general lines.

The Quartermaster General has been charged with the procurement of new vehicles and with the maintenance of those in service. Special vehicles such as tanks and armored cars, which are not of commercial design, are supplied and maintained by the Ordnance Department. Vehicle accessories, including special blackout driving equipment are also developed and procured by these agencies of the War Department.

The Chief of Field Artillery is responsible for the development and improvement of driver selection and driver training techniques. In the near future it is expected that a comprehensive series of tests may be conducted to determine the military utility of the many recent civilian developments in this field.

The Chief of Engineers is approaching the problem from the point of view of traffic engineering. Special systems for the control of military traffic in the combat zone are being investigated and the possibility of organizing special military traffic organizations is being considered. Luminous and phosphorescent signs and markers are being studied in an effort to permit rapid movement at night without lights. The policing of military highways is being studied by the Chief of Infantry in connection with his responsibility for the Military Police.

In the ultimate solution of the problem of military highway management the traffic engineer is destined to play a most important role. For this reason the army has already called on the traffic engineering profession to supply needed talent for a scientific approach to the problem as it will exist in the area of active military operations. In an extreme emergency the army may need every able-bodied traffic engineer that the country can furnish. During this present period of active preparation for National Defense, however, the best contribution that the traffic engineer can make is to win the support of his own community toward a sound local and national program for more effective highway management.

Editor's note: The views expressed in the above article are those of the author only and do not necessarily represent the War Department.

An original article by Captain Warren S. Everett, Corps of Engineers, U. S. Army.

CRITICAL TIMES DEMAND EFFICIENT TRAFFIC REGULATION

By J. W. A. Bollong

STEPS now being taken in connection with national defense make the problem of traffic control in urban areas one of the most serious confronting city governments. In order that industrial activity may proceed rapidly, transportation is vitally important, and our available street space must be utilized to give the greatest capacity without increasing the accident hazard. Only if advantage is taken of modern engineering methods, can full benefit be obtained of such available space.

New industrial plants which have suddenly expanded due to war demands should be required to provide parking space directly adjacent to such plants, off the street area. When two or three shifts are employed then separate parking areas should be provided to eliminate the conflict between changing shifts.

In the construction or reconstruction of buildings, care should be exercised in the issuance of the permits for such work so that interference is eliminated in the available travel area in the street, and that building construction be carried on within the property affected. Openings in the business district or on arterials for utility or franchise pavement cuts should be performed at night and all excavated material removed during the day and the open area covered to permit the passage of traffic.

Transport trucks and trailers are a vital means of transport between cities but should not be allowed to proceed through the central business district or make deliveries there, due to their size and length. These deliveries should be made by smaller conveyances from a loading or freight depot.

Parking meter installations lower the number of police officers required for enforcement of parking regulations as there can be no moving of the vehicle or erasure of the chalk mark which is the only means of identification now in use. Experience with parking meters in various large and small cities shows that there is far more space provided for parking both commercial and private vehicles, and that double parking is eliminated to a great extent.

Comparison of the number of persons transported by various types of vehicles upon the highways in one direction shows somewhat the following:

Street Car—13,500 persons per hour

Trolley Coach—10,500 persons per hour

Motor Bus—9,000 persons per hour

One continuous line of individual automobiles—1,500 persons per hour

These amounts, which are approximate, clearly show the importance of providing every facility for transit movement. This may be accomplished by the installation of skip-stops, thus providing less delay to both transit and other traffic movement, and incidentally, improve the transit schedules. Street cars or buses may be re-routed to prevent left turns in congested districts. Loading zones for street car patrons should be located on the near side and should be at least 30 ft. longer than the car for the prevention of parking at the curb opposite such zones. Danger zones should be designated at car turns to prevent "pinching" of automobiles at the curb.

Trolley bus and motor coach stops should be located at the far side of the intersection, giving a minimum of 52 ft. for one-coach stop, 88 ft. for two-

coach stop, and 125 ft. for a three-coach stop. The street area should be marked in "boxes" of proper bus length when more than a single coach zone is established for the purpose of efficient use of these zones by the bus operators.

To increase the capacity of any street or highway the painting of traffic lines is extremely helpful. All important highways or arterials leading into and through any municipality should be laned for traffic. Additional lanes should be placed at the approach to traffic signals, narrowing to a minimum of 8 ft. if necessary, to procure these additional lanes. Enforcement officers can greatly assist by preventing lane straddling and requiring all traffic to travel in proper lanes.

Signs should be erected on arterials directing slow traffic to the curb lane so that the lanes nearer the center may be reserved for faster-moving traffic. With proper training and the existence of state law, passing may be permitted on either the left or right when the highway is laned for traffic.

Signs should also be erected from 300 to 400 ft. in advance of deceleration or acceleration lanes so that operators will be given opportunity to move into the proper lane for exit or to avoid entering vehicles. Until funds are available, channelization at large intersections may be effected by the use of traffic lines, which lines will often prove the efficiency of the proposed design for a particular intersection.

All of the traffic control methods described in this article are for the purpose of providing additional capacity to existing streets or highways and may be classed as immediate remedies for the relief of traffic congestion. They should assist in the program of National Defense by increasing the traffic movement with safety.

Condensed from an article by J. W. A. Bollong, Traffic Engineer, Seattle, Washington, (Mem. I.T.E.) TRANSIT JOURNAL, September, 1940, pp. 303-305.

THE TORONTO TRAFFIC METER

By T. D. LE MAY

A CLOCKWORK instrument for counting and timing traffic that will perform many of the routine duties of a Traffic Engineer's office can be constructed in a few hours at very little expense.

The device consists of an ordinary cheap alarm clock that rotates a circular chart that can be punctured at will by the operator. The movement of the chart records the elapsed time between the punctures.

The size of the instrument will be governed by the accuracy desired but it has been found that an eight inch instrument as described below, using a 6¾ inch chart, will give clear definition of 5-second time intervals.

The materials:

One dollar alarm clock
2 pieces of ¼" brass rod, 1¼" long
2 pieces brass bar, ⅛" thick, ⅜" wide, ½" long
2 pieces brass pipe, ¼" internal diameter, ¾" long
2 coarse gramophone needles
2 pieces flat spring, 2" long, ¼" wide
2 pieces flat spring, 1¼" long, ¼" wide
1 piece brass plate, 1/16" thick, 2" long, ¾" wide
2 pieces ½" board, 8" square
2 pieces ½" board, 8" long, 1¾" wide
2 pieces ½" board, 7" long, 1¾" wide
4 pieces ½" board, 2½" long, 1¼" wide
1 piece rubber, 1/16" thick, ½" wide
1 hook and eye
1 pair hinges
1 strap for carrying handle

Strip the clock down to the works and back, removing hands, dial, side

and front of case, bell, hammer and any other non-essentials that will come off easily.

Drill hole in center of brass plate that will fit main drive shaft of clock. Shape plate and solder in position formerly occupied by big hand. Solder ordinary pins at each end of plate, head down. Clip pins to one-quarter inch long and sharpen. (Fig. 1).

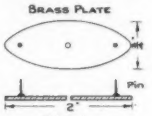


FIG. 1.

Make hole in exact center of one of the 8-inch square boards to take back of clock. This should be a tight fit.

Build up side of box with 1¾-inch pieces of board and insert corner chart supports as shown (Figs. 2 and 3). Every care must be taken to keep the sides of the box square and vertical so that the center of the lid will be directly over the main drive shaft of the clock.

On a diagonal of the other 8-inch square board drill holes 2½ inches and 3 inches from the center, of just sufficient size to take the brass pipes which act as bushings for the plungers. These holes must be vertical and accurately centered on the diagonal. When the lid is attached they will be directly over one of the chart supports, which support should be surfaced with rubber (a piece of inner tube is suitable).

Drill brass rods (plungers) to take butt end of gramophone needles and file 1/16″ collar (Fig. 6).

Channel brass bars (shoes), as shown, to fit springs, and drill holes to fit collars on rods (Fig. 5).

Attach shoes to plungers and solder.

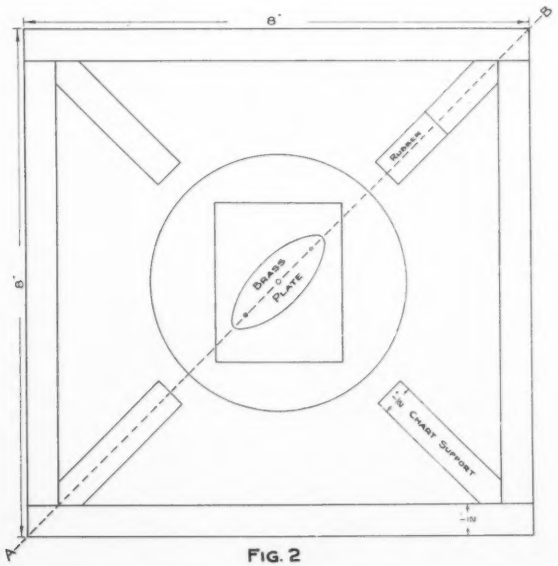
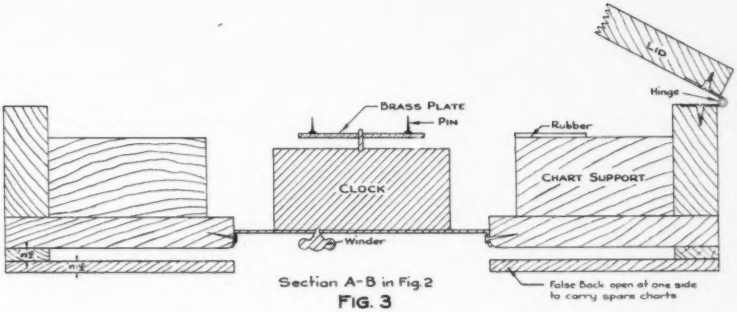
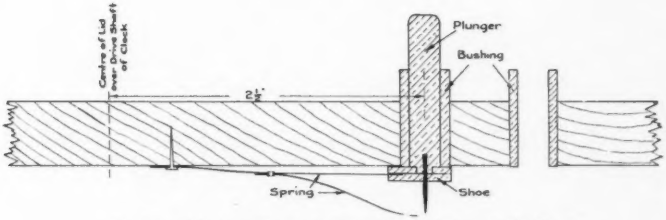


FIG. 2



Section A-B in Fig. 2

FIG. 3



Section of Lid on Diagonal Coinciding with Line A-B, Fig 2 Shewing Plunger in Position

Rivet long and short springs together (Fig. 4) and attach to under side of lid in the correct position to act upon shoes and return plungers to position. The end of the long spring rests in channel of the shoe. The short spring prevents chart from sticking to plunger needle and should be adjusted so as not to interfere with penetration.

The charts should be 6¾ inches in diameter and may be ruled to suit. It has been found suitable to divide them into 360 divisions, or 10-second intervals.

Attach the lid so that its center is vertically over the end of the drive shaft of the clock. Care must be taken that the chart is accurately centered on the end of the drive shaft, and the center of the chart should be punched for this purpose.

When the chart has been attached, close and hook the lid and work both plungers simultaneously. If they do not both record on the same radius of the chart they must be adjusted by driving wedges into the lid beside the bushings. The amount of penetration may be adjusted by lowering the bushings or by changing the length of the plunger bar.

It must be emphasized that accurate and careful carpentry work is essential to secure the proper relationship between the plungers and the clock.

The uses to which this meter may be put are innumerable and embrace every case where an actual picture of traffic movement is required.

Its development originated in the realization that the traffic flow map, which is a traditional feature of all traffic and planning surveys, is largely valueless unless it be corrected on the basis of street capacities, and that the innumerable factors that effect the movement of traffic render this correction impracticable.

Public convenience is not concerned with the number of vehicles that use any particular route but rather with the time that it takes the individual to go from one place to another regardless of traffic volumes.

The traffic engineer is therefore, in the final analysis, concerned with the causes of slow overall speeds and factual data as to where and when delays on any route occur. This data is, of course, obtainable if man power be unlimited but in the average office any economy that can be introduced into the field staff is of distinct advantage.

The machine can be operated by the driver of a car without assistance in any traffic situation and eliminates the bookkeeping necessary where observations are made by the stop watch method. In making speed tests it may be used in conjunction with the speedometer which should be equipped with a trip indicator. The clock is punched every 1/10 or 1/4 mile, or other distance as may be required, the movement of the chart recording the elapsed time between the punchings. Intersection delays are recorded by continuous punching from the time the car is first stopped until it crosses the intersection. The delay record is made with the second plunger, to obviate confusion with the distance plunger which, by comparison with distances scaled from the City map, gives the locations at which the delays occurred.

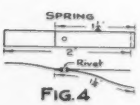


FIG. 4

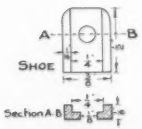


FIG. 5

If the speedometer is not used, one plunger only is required, the recordings being made at predetermined intersections, etc., and noted on the chart after removal from the box.

Every traffic engineer is familiar with the pedestrian who complains that he habitually waits 15 or 20 minutes to cross the street at some point on a main highway. Using two plungers, an actual picture of traffic movement in both directions can be recorded by one observer that will provide factual evidence of the truth of the complaint, or otherwise.

With an 8-inch box, two-way traffic volumes up to 1,000 per hour can be recorded. If the size be increased and additional plungers added, its

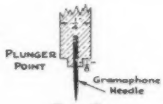


FIG. 6

counting efficiency may be much increased and turning movements recorded, not only from the standpoint of volume but also from the standpoint of actual time of occurence.

Additional efficiency for short time counts can be secured by using a clock which makes a complete revolution in 30 minutes, such as the Kodak timing clock.

The September issue of Traffic Engineering shows an illustration of several observers with a battery of motor driven Munroe Calculators determining cummulative delay units, presumably for the purpose of determining the traffic efficiency of an intersection. It is suggested that this can be more accurately determined by one observer with a traffic meter, recording his delays at that intersection as many times as possible during the rush period.

There are many other useful purposes for this clock which will be apparent to the user. Its principal value is the fact that it records directly the ability of streets to handle traffic not in terms of traffic volumes and delay units, which mean nothing in them-

selves and are only a means to an end, but on the basis of the actual time that it takes an individual citizen to go from one place to another. It will permit the preparation of a map that will show the speed characteristic, not only of every street but also of every block on every street in a city and present a picture that will clearly indicate where remedial measures must be applied to secure adequate traffic movement.

Editor's note: This device is freely offered to the members of the Institute for their own personal use in Traffic Engineers' Offices, but for the use of it commercially, permission must be secured from the author.

An original article by Tracy D. le May, Traffic Engineer, City of Toronto, Canada (Assoc. Mem. I.T.E.)

TRAFFIC ENGINEERING — ITS ORIGIN AND PURPOSE

By H. F. Hammond

TRAFFIC congestion was a serious problem in Rome as early as the fourth century B.C. Construction of the Appian Way was begun in 312 B.C., and at the zenith of her glory the Roman Empire boasted a system of highways totalling over 50,000 miles.

The problems of the Roman traffic engineer were elementary compared with those which confront the traffic engineer of today. Until the advent of steam power, traffic headaches were almost exclusively problems of congestion. But after the appearance of vehicles propelled by steam, and later, by gasoline, the necessity for traffic controls designed to prevent carnage on the roads became acute. One of the first laws regulating the operation of steam-propelled vehicles was an act of Parliament which taxed them highly. They also had to be preceded by a man carrying a red flag of warning.

Prior to 1903 there were few laws in effect regulating the operation of gasoline-driven vehicles. The first automobile traffic regulations were put into effect in New York City in that year, and they were actually more in the nature of police regulations than traffic ordinances. At 5:00 P.M. on the 5th day of August, 1914, the city of Cleveland placed in operation the first automatic vehicle traffic control signals, which consisted of eight high candle-power lights, four red and four green. This innovation was generally hailed as the beginning of a "revolutionary method in handling traffic." However, except for similar individual efforts in several widely separated cities, traffic engineering did not really attain recognition as a profession until the 1920's. In 1921 or 1922 the Illinois State Highway Department first began painting center lines on highways. In 1928 Massachusetts recognized the existence of this growing profession by establishing a State Department of Traffic Engineering. By 1930, 14 formal city traffic engineering departments had been established, and in that year the Institute of Traffic Engineers was organized. Gradually traffic engineering was adopted by many states in the various branches of the state governments, such as state highway departments, state motor vehicle departments, and state police departments. Today there are between 30 and 40 traffic engineering departments in cities ranging in size from New York to municipalities with less than 75,000 population, serving in all a population of about 25 million.

Traffic engineering is rapidly coming into its own. Here is one concrete example of the work constantly being

done throughout the country by trained traffic engineers:

In a twenty-three months' period there were forty-three accidents, involving nine cases of injury and one fatality, at the intersection of Lincoln Way West and William Street in South Bend, Indiana. These accidents cost an estimated total of $14,350. Mr. Ernest H. Miller, South Bend's Traffic Engineer, recommended a number of changes in the existing traffic signals, and the installation of an additional signal face at each approach. In a twenty-three months' period following the completion of these improvements, there were only three personal injury accidents at this intersection. The total saving, after writing off the $900 cost of the improvements, has been estimated at $11,500 for this period alone.

All over the country traffic engineering is producing results in accident prevention out of all proportion to the investment costs. Traffic engineering is now being taught in a number of our more progressive institutions of higher learning, among which are Yale University, Rutgers University, and the University of Michigan. Recently Texas; under the auspices of the Texas State Traffic Engineering Department, conducted a successful traffic engineering conference. In November Illinois will hold its first annual state-wide four-day traffic engineering conference which will be attended by 80 state and local engineers.

The day is not far distant when every city of 50,000 population or over will have its own traffic engineering department. For the trained traffic engineer is an operating engineer. He is the only logical man to keep our automotive traffic flowing smoothly, safely, and economically. He is the man who, in this field will produce inordinate and permanent results at the smallest possible cost.

Condensed from an address by H. F. Hammond, Director, Traffic Division, National Conservation Bureau, (Mem. I.T.E.). Address given before Western Safety Conference, Oct. 15, 1940, Phoenix, Arizona.

MAKING SPEED OBSERVATIONS

By L. E. HENDRICKSON

SPEED observations are very important to any traffic engineering program. There is probably no other subject dealing with traffic over which more controversy will arise and more opinions will be expressed. The majority of cars passing before the eyes of the man standing on the curb, or the man sitting in the barber chair facing Main Street, appear to be exceeding a reasonable and proper speed. If the man behind the wheel had the same perspective to speed as the man watching him drive by, and vice versa, there probably would be fewer accidents due to speed and fewer complaints about unreasonable speeds.

Because this problem of speed is so vital and so important, it is necessary that the speeds at which motor vehicles are being driven on our streets and highways be known. The two most popular methods of measuring speed are by the use of a stop watch or an electrical speedmeter. The stop watch may be operated by hand in conjunction with Eno mirrors or it may be operated electrically or mechanically by using a system of road switches or air tubes stretched across the highway. The electrical speedmeter may be activated either directly from similar road switches or diaphram-type air switches connected to small air tubes.

The Traffic and Safety Division of the Minnesota Highway Department uses an electrical speedmeter developed and built under the supervision of Dr. Herbert J. Reich of the University of Illinois.* This speedmeter was built in July 1938 and was constructed similar to the one in use at that time by the Illinois Highway Department. This speedmeter is used solely for survey work and is not used for speed enforcement.

The operation of the speedmeter is fairly simple. Two flexible rubber-covered electrical switches are placed 15 feet apart on the highway. On highways wider than two lanes, small air tubes connected to diaphram-type air switches which make the electrical contact are used instead of the electrical switches. The switches or tubes appear as pavement joints on concrete roads and blend in with the surface of bituminous roads, so that the motorist, unless he is driving at a very slow speed, does not notice them at all or else already has passed over them before he might slow down. These switches are connected to the speedmeter through long lead-in wires. The speedmeter is generally kept in a private car with regular license plates and no distinguishing identification. The car is usually parked close to the location where the speed survey is being made, but is parked far enough from the traveled portion of the highway and in such a manner so as not to present a traffic hazard or in any way influence the speed of the traffic. Motorists generally assume the survey car is just another parked car and pay little attenntion to it.

The speedmeter is designed somewhat similar to a radio in that it uses regular radio tubes, a condenser, resistors, and potentiometers, besides "B" batteries which are self-contained, and an "A" battery which is conveniently eliminated by connecting the speedmeter to the car battery by means of a jack and plug.

The front wheels of the vehicle strike the first road switch or air tube. This starts the building up of a charge on the condenser. At the same time, a relay disconnects the road switch so that the rear wheels will not affect the meter. When the front wheels strike the second road switch the electrical charge is stopped. The amount of the charge on the condenser is determined by a vacuum tube voltmeter, and this is read directly in miles per hour on the calibrated milliammeter. The speedmeter is checked by a pendulum which gives the same time impulses as are provided by a vehicle traveling the 15 feet between the road switches. Controls are provided for adjusting the meter to read correctly.

At least 100, and preferably 150 or more, vehicles for each direction of traffic should be observed and the speeds recorded separately for each direction. Truck speeds should be kept separate from car speeds. Where traffic is extremely light, we have not considered it worth while to spend over 3 hours for one survey trying to record a reasonable number of vehicles.

The speed surveys should be made during hours of the day when traffic is fairly normal. It is not reasonable to check just below the peak flow, which might be causing congestion. If time permits, it is desirable to make more than one speed survey at the same location, or else make surveys at similar near-by locations and combine the results to get a larger sample. Needless to say, speed surveys made under adverse weather conditions—high wind, rain, sleet, snow, mist or fog, or when the road surface is wet, slippery or covered with snow or ice—will not give a true picture of the situation under normal conditions.

Before getting set to make a speed survey, the operator should ascertain

* "Electronic Circuits for the Measurement of Time and Speed" by Dr. Herbert J. Reich and Hershel Toomin in "The Review of Scientific Instruments," Vol. 8, No. 12, December 1937.

that there is nothing unusual within a reasonable distance that might affect the speed of traffic; such as, construction or maintenance work, improperly parked vehicles, near-by police cars, or obstructions on the highway. In order to gain the confidence of all persons interested in the results of the speed surveys made, extreme care should be taken to prevent any circumstances from affecting the accuracy of them. The results of accurate speed surveys may be doubted if it is discovered that there is cause to question the accuracy of any one survey. It is a good policy to make check runs occasionally to test the accuracy of the speedmeter.

Locations where the speed survey is to be made should be as representative as possible. If speeds at intersections are to be checked it is helpful not only to get the actual speeds through the intersection, but also at places in advance so as to get approach speeds. Similarly, speed surveys made at the beginning of the curve might be supplemented by surveys made in advance of the curve, and also at places on the curve where there might be an accident "hot spot."

In analyzing the data obtained from the speed surveys made, we generally assume that 85 per cent of the traffic will usually be driving reasonably and proper. The upper limit of the pace (the 10 mile interval of speed containing the largest number of cars) is also a good guide to use in establishing a speed zone or in checking the reasonableness of a speed zone already established. Generally we have found the upper limit of the pace to be slightly lower than the speed at or below which 85 per cent of the passenger cars are being driven.

In conclusion, may it again be emphasized that speed observations are so helpful that whenever possible they should be utilized. They are almost indispensable to a program of speed zoning. They provide factual information to use in answering complaints regarding excessive speed. And, they may also be used to show police officials just where there is need to concentrate enforcement to lower existing excessive speeds.

An original article by L. E. Hendrickson, Electrical Engineer, Minnesota Highway Dept. (Junior Mem. I.T.E.).

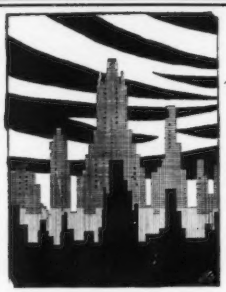
KEEP TODAY'S TRAFFIC MOVING

Among cities which specify that every new multiple-residence must have a car-parking space are Bronxville, Croton-on-Hudson and Rochester, N. Y.; Bound Brook, Northvale, Hillsdale and Nutley, N. J.; Evanston, Flossmoor and Glencoe, Ill.; and Los Angeles and Santa Monica, Calif.

Typical of the provisions applying to multiple-dwelling districts is the Evanston ordinance, which says that every such dwelling newly erected shall provide garage or parking space within the building or on the lot or adjoining property sufficient to accommodate at least one motor vehicle for every two living units. Several of the ordinances, including those of Los Angeles and Santa Monica, require parking space for every individual dwelling unit.

Parking provisions are required for hotels in Southampton, N. Y., and South Plainfield, N. J. Southampton's zoning ordinance requires the hotel to provide 300 square feet of private parking space on the same lot as the hotel or within 200 feet for each sleeping room. South Plainfield makes the requirement 200 square feet.

The theater parking provisions in most of the zoning ordinances specify accessible parking space near the theater big enough to accommodate at least one car for every five to ten seats. Evanston and Riverdale, Ill., Mequon, Wis., and San Marino, Calif., are among cities with such provisions.



Stop, Look and Listen

Editor's Note:

It is fitting that we devote the following columns to news of those who help and support the Institute of Traffic Engineers.

We STOP to think where they are, we LOOK to see what is happening to them, and we LISTEN for new ideas and opportunities to pass on to them.

Stop

Personal Items from Here and There

Virden A. Rittgers, Thomas E. Willier, Walter H. Klapproth, and *Robert O. Swain* gave Texas one hundred per cent representation at the ITE convention in Chicago.

Dr. Miller McClintock, Maxwell N. Halsey, Thomas E. Willier, and *Robert O. Swain* are to present papers at the Texas-C.I.T. Safety Seminar to be held in Austin, December 3, 4, and 5.

J. W. Arch Bollong, Traffic Engineer of Seattle and Member of the Board of Direction of the Institute, has just been elected President of the Western Safety Conference at its Sixth Annual Convention in Phoenix, Arizona.

Ralph T. Dorsey, Melvin J. Bankhead, Frank C. Myers, Milton Harris, Harold F. Hammond, and *J. W. A. Bollong* were I.T.E. members who were present at the Western Safety Conference, and who participated in the program.

Arthur J. Naquin was recently elected the Forty-second President of the Young Men's Business Club of New Orleans, Louisiana. The Young Men's Business Club of New Orleans is the largest young men's organization of this type in the world.

Harold Hammond served as chairman of the traffic engineer's breakfast held during the Western Safety Conference. After a general discussion, it was voted to hold a similar breakfast next year. *Earl Miller,* Traffic Engineer of Arizona, was appointed chairman for next year's breakfast.

Paul Ristroph and *Taylor Lewis* have accepted positions in the Engineering Corps of the U. S. Army and are devoting their attention to traffic problems. Both were in the Officers' Reserve Corps.

Our Congratulations

Dallas' Deathless Day Campaign was halted on the 145th day—a new record for U. S. cities. Based on population, when Dallas reached its 135th day it had equalled the record held by Providence, R. I. Walter H. Klapproth (Mem. I.T.E.) is the traffic engineer of Dallas.

Look

Reports and Publications

ANNUAL REPORT OF THE TRAFFIC ENGINEERING DIVISION, SEATTLE, 1939. J. W. A. Bollong, member I.T.E., Traffic Engineer of Seattle, Washington, has just released his annual report for 1939 which covers the program, recommendations, and results achieved in the traffic engineering division. This 50 page illustrated report clearly shows the comprehensive work being done in Seattle.

ANNUAL REPORT OF THE OAKLAND TRAFFIC COMMITTEE 1939-1940. This is a 28-page report covering traffic signals, stop signs, pavement markings, etc., also an excellent resume of the various research and investigated projects conducted by the committee. Frank C. Myers, Associate Member I.T.E., is Secretary of the Traffic Committee.

ACCIDENT INVESTIGATION MANUAL. The "Accident Investigation Manual" is published by the Northwestern University Traffic Institute in cooperation with the International Association of Chiefs of Police. The Manual is a 226-page textbook covering all phases of traffic accident investigation. It was written especially for policemen and designed for use as a supplement to traffic officers' training schools. Illustrated with more than 50 pictures, charts, diagrams and tables, the book contains sections on The Elements of Investigation, Speed and Skid Marks, Photography, Selection and Training of Accident Investigation Squad Personnel, Criminal Law, Evidence, Report Writ-

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ing, Case Preparation, The Officer in Court, and the Police Officer and Criminal Complaint.

It offers for the first time in a single volume a thorough, practical and understandable treatment of the facts and techniques with which the competent investigator must be familiar.

The "Accident Investigation Manual" is priced at $1.50 and a copy may be obtained by writing to The Northwestern University Traffic Institute, 1827 Orrington Avenue, Evanston, Illinois.

Houston's Traffic Engineering Division

The Traffic Engineering Division of the City of Houston, Texas, was created by ordinance effective April 1, 1940. The ordinance provided for a Traffic Engineer and a staff of assistants and stipulated the salaries to be paid.

During the first month of operation of the department the Traffic Engineer interviewed many prospective applicants for the respective positions. At present the staff is composed of the following: the Traffic Engineer, a secretary, a supervisor of traffic education, a draftsman, two field assistants, a superintendent of the street marking bureau, three street markers, and three street marker helpers. The ordinance provided for a technical assistant, however, it has not been possible to locate a satisfactory person for the position in Houston so that the appointment may be deferred until the first of next year.

Houston has grown rapidly during the past few years so that it now ranks twenty-first in population in the United States with a 1940 population of 386,150. However, even with the rapid growth in population and in registration of motor vehicles, the city has developed without the services of a Traffic Engineer prior to April 1 of this year. The Houston Police Department had attempted to install signs and paint street markings but had been handicapped through lack of funds and personnel. Authority to install signs and markings was delegated to the Traffic Engineering Division soon after the creation of the new department.

Many problems confronted the Traffic Engineer when he assumed office. In its rapid growth the city had failed to recognize the importance of adjusting its transportation facilities to keep pace with the increase in population and the distribution of the city residents. Fortunately the downtown business area was built on a quadrangular street system. Streets are relatively wide with even length blocks. Of course, one disadvantage of this system is that the blocks are short, approximately 300 feet center to center, so that it is difficult to adapt the traffic signal system to provide satisfactory movement of vehicles. Owing to the lack of zoning laws and regulations, the city did not enjoy an orderly growth outside of the business area, so that there now are many irregular-shaped subdivisions with numerous short dead-end streets.

The Traffic Accident Record for Houston has been bad for many years, and also, the City has been confronted with the problem of relieving traffic congestion, even though the streets were basically wide enough to provide sufficient capacity for the expeditious movement of traffic. In consideration of these various factors, it is obvious that the Traffic Engineering Division has a pioneering job to do in Houston. City Officials and the public in general have cooperated in every way with the Traffic Engineer and his staff, so as to improve the traffic conditions and reduce accidents. However, most of the work of the Division so far has been in connection with immediate problems and investigation of complaints and requests.

During the past three months the Traffic Engineering Division has received 186 formal complaints and requests; and has investigated and disposed of 112 of these. In addition, there have been over 125 investigations and special studies made of minor traffic problems.

The Street Marking Bureau is now well organized and has adapted modern methods and procedures for marking the streets and installing standard type signs. The work of this Bureau has been improved through the use of a new traffic line marking machine, and a new panel truck, and an increased budget for the purchase of materials and supplies. Tests are being made to determine the most satisfactory traffic line marking paint suitable for the climate, and street surfaces in Houston.

Numerous special studies and surveys have been completed since April. These include an analysis of present traffic signal timing to ascertain methods for improving traffic control in the downtown district; a study of street traffic and the need for additional one-way streets; an investigation of the accident investigating and reporting system in the Police Department; a study of proposed bus routes; an investigation of parking conditions and regulations; and many other surveys and studies.

The Traffic Engineering Division is cooperating with the City Planning Commission in developing plans for future street facilities to more adequately serve the City of Houston. Now that the need for traffic engineering services has been established and the City recognizes the value of a Traffic Engineering Division, there is every reason to believe that traffic accidents will be reduced and traffic will move more expeditiously throughout the city.

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Listen

TRAFFIC ENGINEERING POSITION AVAILABLE

White Plains, New York announces the availability of a traffic engineering position. This position offers an excellent opportunity for an up-and-coming young man. It pays $2500 a year to start. The traffic engineer will report directly to the Director of Public Safety.

Anyone interested in further details, may write to Harold F. Hammond, Institute of Traffic Engineers, 60 John Street, New York, N. Y.

Western Safety Conference

The Western Safety Conference was held October 14-18 at Phoenix, Arizona. The following papers were presented by Institute members: "Experience with Divided Highways", "Use of Channelization to Regularize Traffic Movement", "Channelization in Relation to Pedestrian Protection", "A study of Traffic Fatality Rates." The conference held two traffic engineering sessions: one on Wednesday afternoon and one on Thursday afternoon. They were reported to have been exceptionally well attended. The Seventh Annual Conference is to be held in Seattle in 1941.

Traffic Engineering Conferences

New Jersey—New Jersey highway and traffic engineers will meet in New Brunswick November 19 to discuss highway expansion and national defense in the first of a series of conferences sponsored by the Rutgers University Extension Division.

In cooperation with the traffic committee of the New Jersey Society of Professional Engineers, the Extension Division has arranged, through its Bureau of Public Safety, to have Maxwell N. Halsey (Mem. I.T.E.), associate director of the Yale University Bureau for Street Traffic Research, and Harold F. Hammond (Mem. I.T.E.), director of the traffic division of the National Conservation Bureau, as speakers at the afternoon meeting.

The meeting will be held at 2 p.m. in the University Extension Division Building under the direction of Prof. Lawrence B. Tipton (Affil. I.T.E.), head of the Bureau of Public Safety in the Division.

Illinois—Municipal, county, state and consulting engineers engaged or interested in traffic engineering will meet at Champaign-Urbana, Illinois, November 26-29, for a conference on traffic engineering. This conference, sponsored by the Department of Civil Engineering, University of Illinois, and the Illinois Division of Highways, will cover such subjects as: Why Traffic Engineering, Traffic Engineering and National Defense, Human Behavior and Limitations, Administration, etc.

The conference will start Tuesday morning, November 26, at 8:30 a.m., and sessions will be held daily until 4:30 p.m. Among the participants who are Institute members are: C. C. Wiley, Harry H. Harrison, John L. Towers, George W. Barton, Otto K. Jelinek, William C. Brandes, Donald C. Berry, William R. McConochie, Earl J. Reeder, Leslie J. Sorenson. Acting Coordinator of the conference will be Harold F. Hammond, director of the traffic division of the National Conservation Bureau.

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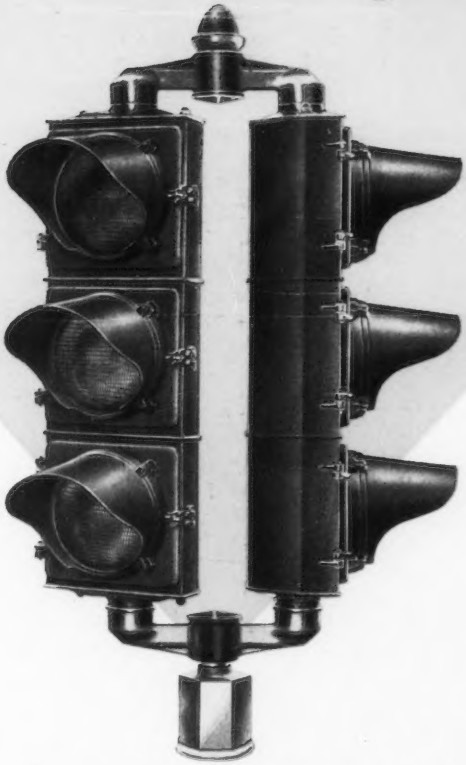

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Looking Ahead

Dec. 2, Washington, D. C.: Twentieth Annual Meeting of the Highway Research Board of the National Research Council, National Academy of Sciences. Roy W. Crum, Director, Highway Research Board, Washington, D. C.

Dec. 6, Harrisburg, Penna.: Statewide Industrial Safety Engineering Conference. Harry D. Immel, director, Bureau of Inspection, Penna. Dept. of Labor and Industry, Harrisburg, Penna.

Mar. 6, Beaumont, Texas: Southwestern Industrial Traffic League, Edison Hotel, Beaumont, Texas. F. A. Leffingwell, Secretary, 1908 Sante Fe Bldg., Dallas, Texas.

Mar. 11-12, Philadelphia, Penna: Seventh Annual Philadelphia Regional Safety Conference. (Bellevue Stratford Hotel.) Walter W. Matthews, manager, Philadelphia Safety Council, Chamber of Commerce, 12th and Walnut Streets, Philadelphia, Penna.

Mar. 31-Apr. 1, Boston, Mass.: 20th Annual Mass. Safety Conference. Lewis E. MacBrayne, general manager, Massachusetts Safety Council, 80 Federal Street, Boston, Mass.

Apr. 1-3, Pittsburgh, Penna.: Western Penna. Safety Council, 17th Annual Regional Safety Engineering Conference. E. J. Kreh, secretary, 704 Empire Bldg., Pittsburgh, Penna.

Apr. 2-3, Newark, N. J.: Seventeenth Annual Eastern Safety Conference. Fred M. Rossland, secretary-manager, Newark Safety Council, 24 Branford Place, Newark, N. J.

Apr. 15-17, Columbus, Ohio: All Ohio Safety Congress (Neil House). Thomas P. Kearns, superintendent, Division of Safety and Hygiene, Industrial Commission of Ohio, Columbus.

Apr. 22-25, New York City: Greater New York Safety Council, Twelfth Annual Convention and Exhibition. (Hotel Pennsylvania.) Greater New York Safety Council, Inc., 60 East 42 Street, New York, N. Y.

May 6-8, Chicago, Ill.: Midwest Safety Conference. (Hotel Sherman.) Geo. G. Traver, manager, Greater Chicago Safety Council, 222 North Bank Drive, Chicago, Ill.

May 22-24, Norfolk, Va.: Seventh Annual Va. State-wide Safety Conference. (Monticello Hotel.) Wm. M. Meyers, executive secretary, Richmond Safety Council, 30 Allison Bldg., Richmond, Va.

Editor's Note

Many members and subscribers are anxious to get ideas on the various phases of your work, and only through the medium of contributing freely can we make this magazine the official spokesman of our entire group.

Always of real interest to the members of any professional group are those items which have to do with other members of the organization—what they are doing, where they have been, and where they are going. To all of you, we extend an invitation to cooperate with us by sending in your news items and any original articles which you deem worthy of the editor's consideration.

All copy must be in the hands of the editor before the tenth of the month it is to appear in print!

Frankly Speaking

Our Christmas Wish

IN RECENT years, traffic has grown by leaps and bounds. Motorists travel a thousand miles now where they traveled a hundred miles fifteen years ago. Out of efforts to provide traffic regulations and new devices have come new methods which are now accepted as standard. But we must stop our uncertain practices and give this job new emphasis. There is no longer any excuse for the confusion all too evident in our roads and streets. There is no reason to continue our stabbing in the dark.

Highway engineers have for years felt the need for traffic engineering. Now that this need can be met effectively and scientifically by the Traffic Engineer, it is no more than fair that we should hope and expect the recognition this profession deserves.

There is no reason to point the finger of blame at anyone for the situation which we find today. Those men who are responsible for the signs, the signals, and all the other control features on our highways have acted as best they could under the circumstances. In fact, it is unfair to condemn highway administration generally. Great strides have been made, and many lives have been saved. But highway administrations must be condemned if traffic engineering in the future is throttled, and not permitted to make the contribution of which it is capable.

There have been Traffic Engineers for a number of years now. Through the broadening of their scope of activities, through the application of hard work and scientific research, this group is trying to demonstrate to the entire nation the importance of the field of traffic engineering, and what it can accomplish when properly applied. Traffic engineering is only beginning to assume the position which it must have in the more general field of highway engineering.

"The Traffic Engineer is a child of society, born of necessity and placed very much on the spot by the fact that his employer, the public, is also his customer, and therefore his worst critic." This is quite true, but is there any reason that every Traffic Engineer should not receive the recognition, and opportunity to prove himself and his work is of vital necessity to his community, county, or state?

We see none—so it is with a sincere desire for its fulfillment do we make this our Christmas Wish!

Laurence B. Tipton

Editor, Traffic Engineering

TRAFFIC ENGINEERING EDUCATION

By ROGER L. MORRISON

THE mayor of a city of 80,000 population once said, after listening to a brief round-table discussion of traffic matters, "Oh well, after all, handling traffic is just a matter of common sense. There is no particular science to it." According to this opinion, a good sensible farmer could work out solutions to difficult traffic problems as well as the most experienced traffic engineer. Absurd as this is, if "policeman" is substituted for "farmer" it is probably safe to say that a similar opinion is now held by the majority of public officials in all but a few cities. This paper might well begin, therefore, with a discussion of a course to educate public officials as to the need for traffic engineers, but I am afraid that none would take the course.

Those who *can* be assembled for traffic engineering study may be divided into four groups, as follows:

1. Engineers who are able and willing to devote an entire academic year to a comprehensive course, preferably a graduate course, in traffic engineering and related subjects.

2. Employed traffic engineers who wish to spend two weeks, or less, in concentrated study to broaden their knowledge of technical procedure, and to learn the most recent developments in the traffic field.

3. College students who wish to take one or more semester courses in traffic engineering to qualify them for minor positions in traffic work or to broaden their training in highway or municipal engineering, city planning, municipal administration or other work where some knowledge of traffic engineering is desirable.

4. College students who have no particular interest in traffic engineering as such, but who should have some incidental instruction in fundamental traffic engineering principles as parts of courses in highway engineering or other subjects listed above. The desirability of such instruction seems too obvious to need discussion.

The only course now offered for those in Group 1 is that given at Yale University. Such a course should only be given by experts, and until city officials and the general public have a greater realization of the need for traffic engineers than they have at present there appears to be no reason for duplicating this course elsewhere. One university can meet the present demand for men with this kind of training.

Short courses for employed traffic engineers (Group 2) have been offered at various times at Harvard University, the University of Michigan, Rutgers University, the University of Texas and the University of Tennessee. Those at Michigan and Tennessee were offered, together with courses in related fields, by the National Institute for Traffic Safety Training which is sponsored by a number of organizations, including the Institute of Traffic Engineers. A four-day course, or conference, along this line has been announced by the University of Illinois, and one-day traffic engineering conferences have been held annually at the University of Michigan since 1927.

The lecturers at these "in service" courses have been traffic engineers of broad experience, and the results have been most gratifying. The attendance has been as large as could be conveniently handled. This indicates that such courses fill a real need, and that one or more can be offered annually to advantage in different parts of the country.

Since a two-hour semester course is roughly equivalent to two weeks of full-time work, such a course, intended for the college students in Group 3, can cover about the same ground as a two-week short course. There are about nine colleges now offering instruction of this kind, two or three of them having started more than fifteen years ago.

It is highly desirable that such work be given by teachers with traffic engineering experience, but where that is impossible the teacher should have completed an "in service" course, or its equivalent.

We may hope that the time will soon come when engineering graduates, having taken such a course, will be able to obtain traffic engineering positions without difficulty, but they should not be led to believe that such is the case at present.

For the students in Group 4 there is no question as to the desirability of extending traffic engineering instruction as much as possible. Highway and municipal engineers should not design roads and streets without knowing much more about traffic needs, hazards and economics than many of them do at present, and the need for such knowledge becomes greater as larger sums are expended on important thoroughfares. The same is true of city planners. Also, city managers should certainly know something about the causes of traffic problems and their proper solutions.

It seems therefore that the most profitable fields for the extension of traffic engineering education at present are short courses for engineers in service and the teaching of traffic engineering fundamentals in connection with courses in highway engineering, city planning and municipal administration.

The two great handicaps to college training for traffic engineering positions are the failure of the public in general to realize the need for traffic engineers, or even to know what they do, and the failure of city officials to understand that a traffic engineer should have special training for such work. There are still too many officials who feel that residence in the city is a more important qualification than special training or experience in traffic work.

It is a pleasure to be able to add that the realization of the need for traffic engineers is slowly growing all the time, and that the greater importance of technical qualifications as compared to residence requirements is being better understood and accepted. The Institute of Traffic Engineers is playing an important part in this improvement of public attitude toward traffic engineering, and has also accepted a responsibility for assisting in the establishment and maintenance of high standards in the education of traffic engineers.

An original article by Roger L. Morrison, Professor of Highway Engineering and Highway Transport, University of Michigan. (Member I.T.E.)

THOSE TWIN PROBLEMS — DARKNESS AND PEDESTRIANS

By T. J. SEBURN

AN ANALYSIS of accident facts in Kansas City, Mo., indicated that in 1938 three-fourths of our serious traffic accidents had occurred during the hours of darkness, and we found that during the same hours only one-third of the total traffic movement was on the streets. In other words, three accidents occurred at night for each one reported during hours of daylight, and at this same time only one vehicle was on the

streets for every two operating in daylight.

The Police Department recognized this condition, and particular stress was laid upon night enforcement. Police officers were assigned to the more hazardous sections in shifts which provided 24-hour supervision. As a result, the percentage of night accidents was reduced until approximately 50 per cent occurred during the hours of darkness. This was a considerable improvement; and it was also a definite indication that the problem could be met by proper attack.

We felt that still more could be done to reduce the appalling night toll, and determined to make a test of reduced speed for night driving.

Let me emphasize at this point that we do not feel that this program is a substitute for adequate street lighting, but we also feel that no city can hope to equal daylight conditions with artificial light on all its streets. A great improvement can be made on the major traffic arteries, and some day these may even be so lighted that they will compare very favorably with sunlight.

But the question was: Should we wait for that time or should we attempt to do something immediately?

Our test of the night speed limit of 25 miles per hour on streets where the daylight speed is 35 miles per hour showed that during the year 1939 a 60 per cent reduction in night-time accidents was made, while the reduction in daytime accidents amounted to 10 per cent. Present experience is that our streets are practically as safe at night as they are in daylight.

About 70 per cent of our fatal accidents in urban areas involve persons on foot, and detailed studies indicate that in two-thirds of them the pedestrian was at least partly at fault.

The adult pedestrians have not accepted their share of responsibility for their own safety, while our children have proved that it can be done. With the best educational methods and strict supervision over their actions, we find that in general throughout the nation the child accident rate has been reduced considerably. The children use the same streets as the adults. They face the same drivers of motor vehicles. Their speed in walking across the street is no greater than that of the average adult. In fact, they are superior to us grown-ups in only one respect, and that is the fact that they have realized their proper conduct in traffic, and as a result of this realization they are using our streets with a greater degree of safety. They are sharing the responsibility.

Although the pedestrian in daytime presents quite a hazard, it is even more necessary for him to do his share at night. Photographers have found that it takes a larger stop opening to photograph a person in dark clothing than a person dressed in light clothing. Thus science has definitely proved to us the fact that with the best of lighting conditions pedestrians at night must carry an additional share of the responsibility.

It has long since been recognized that when a driver approaches a traffic signal with the red light against him, or when he faces a stop sign, he must obey these devices regardless of any other condition on the street. As a result of judicious installation of stop signs and rigid enforcement of these provisions, we have found in the last several years that serious traffic accidents involving only motor vehicles have steadily decreased.

Not so with those involving pedestrians. These persons must be forced to obey the same rules that apply to them while they are at the wheels of their motor cars. It is not enough for our traffic laws to say that a person crossing in the middle of the block should yield the right-of-way to drivers on the street; we must say that he must not cross in the middle of the

block, and we must provide additional facilities for his safety in crossing.

It appears to me that (1) the night driving conditions, and (2) the pedestrian problem, are the most important accident facts for consideration at this time.

Condensed from an article by T. J. Seburn, Traffic Engineer, Kansas City, Missouri. (Member I.T.E.) AMERICAN CITY, November, 1940.

A PORTABLE PHOTO-ELECTRIC SPEED RECORDER

By HOMER J. DANA

AT THE request of, and in cooperation with, the Washington State Highway Department, a portable speed recorder has been developed for the use of the traffic engineer. It consists essentially of two units, the transmitter and the receiver. Both are mounted on heavy steel tripods and each has its separate storage battery supply. In order to contribute to the stability of the tripod mountings, the storage battery box can be clamped rigidly to the under side of each, thus lending the weight of the battery to resist the vibrating effects of passing traffic.

The transmitter consists of a ⅛" welded steel case, mounted securely on the tripod by means of four adjustable leveling screws and a pivot bolt. Two 32 c.p. headlamp bulbs are mounted in the transmitter case and are adjustable for alignment and are focused behind 4" lenses. These lamps are spaced twenty-four inches apart horizontally and focused to project horizontal beams of light across the roadway and into the receiver. Infra red filters make these beams invisible to passing motorists. Power consists of one or two six-volt storage batteries.

The receiver consists of a steel case somewhat similar in design to the transmitter case, and is likewise mounted on a steel tripod equipped with battery box. Focusing lenses project the light beams through orifice masks onto photo-electric cells. Power for the receiver is a six-volt car battery. Filaments of the vacuum tubes are six-volt. Plate voltage for the P. E. cells and for the vacuum tubes is supplied by a dual self-rectifying vibrator type high voltage supply unit.

The power pack is mounted on a chassis, located in one side of the receiver case, and the timing circuit is mounted in a separate chassis in the other side of the case. Both units are readily demountable from the case for inspection or repair. A primary switch controls the battery supply to the receiver.

Either an indicating meter or a recording meter may be used for the determination of speed. Each meter is provided with a center zero scale, calibrated in terms of miles per hour. Left-bound traffic registers to the left of zero and right-bound traffic to the right of zero on the meter scale. The meter is provided with a fifty foot extension cord so that the observer may retire from the notice of the passing motorist and thereby assure no disturbance to the normal flow of traffic.

The recording meter simply replaces the indicating meter and provides a permanent record of the number of cars in each direction, the speed of each, and the time of day when they passed.

The tripods are fabricated from steel pipe, electrically welded to form a rigid mounting for the equipment. The legs are of 1¼" pipe with telescoping 1" pipe extensions fitted with special combination feet for both soft and hard ground. The two tripods are identical and interchangeable.

In operation the transmitter on its tripod and with its battery is located on one side of the street, and the receiver assembly is located on the opposite side. One man can erect and align the speed recorder in from ten to fifteen minutes and can dismount and load it in about six minutes. The transmitter, which is the heaviest unit, weighs about fifty pounds and the tripod weighs about forty pounds.

The speed recorder measures speed of passing vehicles consistently within one mile per hour of the speedometer reading on the test car. It is calibrated for speeds from fifteen to eighty miles per hour, although it could be calibrated to a different range if required.

An original article by Homer J. Dana, Assistant Director, Engineering Experiment Station, State College of Washington.

NATIONAL MOTOR VEHICLE FATALITY RATE COMPARISONS AND THEIR EFFECT ON THE ELEVEN WESTERN STATES

By J. W. A. Bollong

THE compilation, computation and publication of motor vehicle fatality rates are unquestionably valuable, if not indispensable aids to our general economic and social welfare; to economic welfare because through the media of engineering, education and law, they serve to reduce wastage of property and to guide the expenditure of funds for safety activity into efficiently productive channels; to social welfare because they provide the incentive that arouses our humanitarian instincts to conserve the lives of our children and our fellow citizens. The fluctuations of these rates are a true index of our progress or failure in these principles.

From our efforts toward economic and human conservation, has sprung a friendly rivalry between the states of our country and between its other political subdivisions. This rivalry of state against state and city against city has contributed greatly to the reduction of motor vehicle fatalities. This competitive spirit is natural and healthy and we should continue to foster it.

The generally accepted basis upon which fatality rates are computed is that of deaths per one hundred thousand persons. This method has, of course, a sound numerical background in the decennial population census of the federal government and these figures are available for all states and municipalities. The serious objection to this population-based fatality rate is that it does not take into consideration the exposure of any specific group to motor vehicle accidents. To follow a simple line of reasoning, there are no motor vehicle fatalities on Mackinac Island in the State of Michigan, because no motor vehicles are permitted on the island. The growth of the traffic accident problem has been commensurate with the increase of automobile ownership and use, and not upon increases of population.

There are several valid objections to the predication of fatality rates on automobile ownership. One of these exists in the fact that while registration records are complete for each state, they are usually an estimated value of doubtful accuracy in municipalities. Another objection is seen in the tourist travel which all states and municipalities must consider as contributory to accidents in a widely varying degree.

Motor vehicle fatality rates, if predicated on automobile use or mileage, probably give a true indication of the

Fig. I

Fig. II

Fig. III

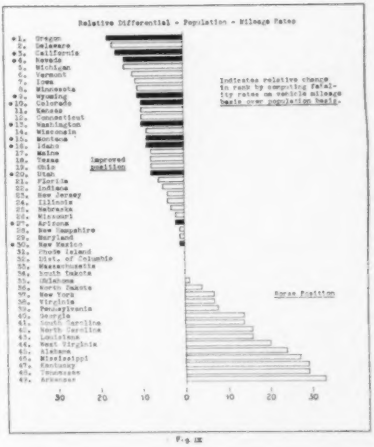


Fig. IV

Roster Issue

It is fitting at this season of the year that we all know where each member of the Institute of Traffic Engineers is located. After a complete survey of the membership during the past two months, we offer this, the Roster Issue, and hope you will take the membership pages that are enclosed herein, and keep them for your personal reference files.

relative severity of the problem in consideration of the exposure to accidents. The objection to this method lies in the lack of gasoline and automobile registration data for political subdivisions other than states. The position of each state, in the order of the relative severity of their traffic fatality problem on a population basis, is shown on Figure I. It will be noted, with the exception of Washington and Montana, the western states are grouped near the bottom of the chart. On Figure II, it will be noted there is considerable change in the position of the western states when fatality rates are predicated on automobile registration. It will also be noted the State of Nevada, which has a small population and automobile registration, has changed its position only slightly over Figure I.

In Figure III the position of each state is shown on a mileage basis. Again a change of the position of the western states will be noted. Note also, the State of Nevada is now placed in a relatively much higher position. It is entirely probable that the change in the status of Nevada is influenced by the large volume of tourist and recreational travel in that state.

Figure IV indicates the relative amount of change in the position of each state if fatality rates on a mileage basis are substituted for rates based on population. Without exception, the western states have improved their position.

It is not the purpose of this article to depreciate the safety activity in states outside the western area. It may be rightfully assumed however, that progress toward greater traffic safety in the western states, counties and cities is not truly reflected by fatality rates based on population. It is logical to believe that accident potentialities increase proportionally with the number and use of automobiles. Automobile ownership per capita is greater in the western states than in any other group, and these simple charts prove that the use of the automobile is greater than in other areas.

It is also not within the province of this article to attempt to formulate a method to extend the computation of fatality-mileage rates to municipalities; in fact, it is doubtful if such a system would be practical. However, it is the firm belief of the writer that in the interest of the wholesome competitive attitude between states, counties and cities in saving lives, some concession should be made to the western area. For purposes of organized national safety contests, for educational publicity, and for true comparisons with other areas it is the belief of the writer that a handicapping system is a possible logical solution to the problem. This could be based on the relative difference between population and mileage rates in all states and pro rated to municipalities within their boundaries.

In conclusion, the writer hopes further study will be given to this problem and that meanwhile the towns and cities of the west will gain considerable satisfaction in knowing that if their fatality rate is high, then perhaps the situation is not as black as it has been painted.

A paper presented at the Western Safety Conference by J. W. A. Bollong, Traffic Engineer, City of Seattle, Wash. (Member I.T.E.)

A Merry Christmas to All!

The President, Officers, and Board of Direction of the Institute of Traffic Engineers, with the Editor, the Circulation Manager, Advertising Manager, and Associate Editors of TRAFFIC ENGINEERING, wish for each and every member of the Institute, and every reader of TRAFFIC ENGINEERING a very happy Christmas and successful New Year!

NEW DEVELOPMENTS IN PUBLIC OPINION MEASUREMENT

By H. D. READ

MODERN polls are scientific outgrowths of the old-time straw vote. The difference, however, is a vitally important one. Formerly, newspapers or magazines counted votes on a hit or miss basis, without regard to whether or not the people casting those votes were representative of the entire voting population.

Any straw vote was called a success if it named the winner, even though its prediction may have varied widely in percentage from actual results. No one seemed to pay much attention even if in presidential polls, entire states were placed in the wrong column.

What happens now? Modern techniques make it possible, by interviewing a relatively small, scientifically selected cross section of the population, to predict with amazing accuracy how the entire country and each state will vote on election day. Frequently the outcome is predicted with an error of less than one per cent, as in the Gallup poll two years ago on the Lehman-Dewey election for governor of New York.

Of course, it is not always possible to be quite this accurate, but we can usually be sure in advance that the error will not exceed three per cent.

This reliability is obtained by three primary factors:

1) A big enough sample,

2) A sample that is really representative of the population, and

3) Sound techniques for obtaining accurate information from the people interviewed.

First, the size of the sample is determined by statistical laws which give assurance that after a certain number of interviews have been obtained, any additional interviews will make no important changes in the results. This required sample may vary from as few as 200 interviews to as many as 60,000.

Much more important than the number of interviews is their representativeness. It is possible to determine the attitude of a large public by interviewing a small part of it, only if the people interviewed have approximately the same proportion of men and women, city and rural residents, upper and lower income groups, and other divisions of the population as the larger public.

Therefore, in modern opinion research, extreme care is taken to see that interviews are obtained from a truly representative sample. This is the point on which the LITERARY DIGEST fell down. With 3,000,000 ballots, the DIGEST made the unfortunate error of predicting Landon's election, whereas the Gallup poll and Fortune survey, with less than 50,000 ballots each, accurately predicted not only Roosevelt's re-election but also his winning margin.

The DIGEST sent its ballots only to its own subscribers, to automobile owners and to telephone subscribers—mostly upper and middle income people. On the other hand, the Gallup and Fortune polls interviewed accurate cross sections of the entire population, including lower income people. Because the 1936 election marked a major political cleavage between the "haves" and the "have-nots," the DIGEST, with probably the largest sample that has ever been taken of the upper and middle income groups, failed disastrously.

Thus, it may be seen that the accuracy of the cross section is usually more critical than the size of the sample.

The third factor in sound opinion research is the technique used in obtaining information from respondents. Assuming diligence and honesty of interviewers (factors which must be checked with extreme care), the phrasing of questions is the most important element.

Experience has shown that there are certain types of things that can be asked of the public directly. For example, people will tell you which of two candidates they prefer for President, or they will usually tell you with no reticence how many children they have. On the other hand, they are not so apt to reply truthfully to the questions, "Have you ever been divorced?" or "Is your hair naturally curly?" Answers to such questions must be obtained by skillful indirection.

One illustration: About a year ago a survey question was phrased, "Have you read GONE WITH THE WIND?"

Test interviewing showed that too many people replied they had read it. The book was a best-seller, and apparently many people wanted to be in the swim. Because of this prestige factor, the research staff changed the question to say, "Do you intend to read GONE WITH THE WIND?" This saved face for everybody who had not read it, whereas those who had were quick to say, "I have read it."

What can all of this mean that is of special interest to traffic engineers? I would like to ask several pertinent questions.

First, I wonder if traffic engineering has not operated somewhat on the mousetrap theory. You recall the old theory that "If you build a better mousetrap, the world will make a beaten path to your door."

Business, however, long ago learned that it is not enough just to build a good product. You also need to tell the public about it. One seldom hears of Pear's Soap today, and yet some people in this room can remember that Pear's and Fairy soaps were just about the only soaps sold in volume in this country.

What ever happened to "Spotless Town?" Sapolio made it a family byword for many years. Then for some reason they stopped telling the public about it, and today you practically never hear of it.

I wonder if traffic engineers haven't done somewhat the same thing—neglected to tell the public the real story of what they have done in traffic control. Certainly this should be of genuine public interest.

I know when I lived in Chicago, names such as Leslie Sorenson, Otto Jelinek, and George Barton were very familiar to me, but I confess that aside from a few striking and dramatic engineering developments, I had practically no knowledge of the many things these men had done in contributing to better traffic control in this area. That is not surprising, because it is always easier for the public to become familiar with and remember an individual or a personality than it is for them to appreciate such a person's acts or any objective thing.

Of course the public cannot avoid seeing the striking or dramatic achievements of traffic engineering, like the Pennsylvania turnpike, progressive signal lights, or such especially interesting plans as the modern traffic direction on Lake Shore Drive here in Chicago. I know my personal reaction to an eight-lane boulevard being controlled to handle seven lanes of inbound traffic with only one outbound in the morning, and the reverse in the evening. That always impressed me as an outstanding evidence of somebody doing some really intelligent thinking on what must have been a very tough problem. From personal experience, I know the traffic log-jams that used to develop on Lake Shore Drive and Michigan Boulevard

during the morning and evening peak hours, and by contrast, the present handling is most phenomenal.

The public cannot help being aware and being appreciative of developments of this kind. But how much does the public realize the tremendous number of things that are less noticeable but which are being done every day in little ways to improve their safety, convenience, speed of travel, and actually making their cars useable? There is not too much public awareness or appreciation along these lines, I am afraid.

Perhaps the reason is that there is not complete or accurate information as to what the public is interested in. If there were such information, perhaps more effort could be devoted to things which may seem less important from an engineering standpoint, but which have more public appeal. Then, TELL the people these things are being done, but that they are only a part of the hundreds of everyday improvements being made solely in the public interest.

The principal value of such a program would be to give a public educational or informational campaign rifle fire direction rather than shot gun coverage of a more scattered hit or miss nature. If the public relations of traffic engineering—and there may be a real place for public relations in traffic engineering—are sharp angled in accord with what the public best understands and is most interested in, it is logical to assume a much greater public awareness and approval of what traffic engineering is accomplishing. Equally important, therefore, this may result in a much greater cooperation by the public in safety measures, which certainly require more individual recognition of "what part I must play in preventing accidents," rather than in condemning the "other fellow" for the failure to cooperate.

In other words, maybe traffic engineering could profit from some everyday MERCHANDISING.

One illustration may emphasize this idea more pointedly. Hawley Simpson could tell you that in the transit industry, for example, surveys have shown that although it is basic today that public transportation systems must have up-to-date street cars and buses to win frequent riders, simply providing this new equipment is not enough in itself. It is vitally important both that the equipment be provided and that the public be told continually about the equipment itself, and also what it means to the public in better service, improved schedules, faster riding, etc.

This fact was strikingly illustrated by surveys in two cities, in both of which all new bus equipment had been purchased within the past five years. In one city the public was told repeatedly about the new equipment, improvements in service, and the desirability of using public transportation. As a result, the survey showed great public awareness of the fine equipment and the desirability of using the buses. There was actually a civic pride in the local transportation system. More important, the people have responded with a tremendous increase in the use of the bus system.

On the contrary, in the other city where equally new equipment was provided, but where the buses themselves were relied upon to do their own selling to the public, and not one word was told the public of the improved benefits that had been provided, the survey showed very little appreciation of what the bus company had done, and a complete absence of civic pride in the local transportation system.

I wonder if there are not similar contrasts in public reactions to improvements in traffic control where traffic engineers have seen that the public was reminded about them, and in other cities where the public has not

been told of the benefits, but where the improvements have been expected to speak for themselves.

The second reason why it might pay for traffic engineers to know more about public attitudes is for the guidance in what projects to undertake, and how best to undertake them in the public interest. Also, what the public thinks about present improvements, what it believes are the good points, and what things does it criticize.

Editor's note: This entire address will be printed in the Annual Proceedings of the Institute of Traffic Engineers.

Condensed from an address presented by H. D. Read, Vice-President, Opinion Research Corp. before Institute of Traffic Engineers, Chicago, Illinois, October, 1940.

RECORDING SYSTEM FOR DIAGNOSING TRAFFIC CAUSES

By E. L. Robinson

DETERMINED to diagnose correctly the causes of traffic accidents on the streets and highways of Los Angeles County, California, the county road department developed a unique recording system. From it can be picked the "accident prone" locations, areas, or stretches and their complete historical background obtained. Remedies can be prescribed accordingly.

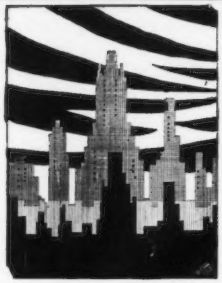
Dealing with 4,273 miles of county highways, and 510 miles of State highways, M. J. Bankhead (Mem. I.T.E.), County Traffic Engineer, has found the system invaluable in determining the cause of traffic accidents on the highways under the department's supervision.

The system, devised by Mr. Bankhead, is simple, complete, and accurate. On 66 detail maps of Los Angeles County, the engineer records accidents with metal bound discs placed on screw tagholders. These maps are 5 by 7 ft. in size, and are drawn 600 ft. to the inch. As each accident occurs, the engineer places a screw tagholder at the location of the accident on the map. On this is hung a small white disc. On the back of the disc is a file number and a date. The file number refers to the detailed report on that accident.

For the first three accidents at any given location, the recorder hangs on another white tag. For accidents Nos. 4 to 6 he uses green tags, for Nos. 7 to 9 yellow tags, for No. 10 up, red tags. The maps show up danger zones at a glance. They facilitate analysis of accident conditions by providing instant reference to the detailed accident reports.

The Los Angeles engineer's system is enabling the traffic engineer to diagnose each danger zone whether it be intersection, curve, bridge head or continuous stretch, with actual facts based on accidents reported by the sheriff's office. When an intersection like Lakewood Blvd. and South St. gets spotted with red tags it calls for a different treatment than spots, areas or stretches with only white tags. And when complaints come in to headquarters asking for a specific corrective measure at a particular danger zone, Mr. Bankhead has immediate access to the accident history—and acts accordingly. His diagnosis, and treatment, will doubtless be more accurate and effective than that of the complainant.

Taken from Roads and Streets, November, 1940, Pg. 47.



Stop, Look and Listen

New Appointments

Hawley S. Simpson, President of the Institute of Traffic Engineers, has appointed Roger H. Gilman (Jun. I.T.E.), editor of the 1940 ANNUAL PROCEEDINGS, and Light B. Yost, (Affil. I.T.E.), as associate editor. Editor Tipton also wishes to announce the appointment of Ralph T. Dorsey, (Mem. I.T.E.), Traffic Engineer, City of Los Angeles, and Wortham W. Dibble (Jun. I.T.E.), Acting Traffic Engineer, South Carolina State Highway Department, as associate editors of TRAFFIC ENGINEERING.

Stop

Personal Items from Here and There

Adolphus Mitchell, (Jun. I.T.E.), Traffic Engineer of the North Carolina State Highway and Public Works Commission, has recently taken over the collection and analysis of accident records in addition to other duties.

Wortham W. Dibble, (Jun. I.T.E.), Acting Traffic Engineer, South Carolina State Highway Department, led the general discussion at the Street and Highway Safety Session of the South Carolina Statewide Safety Conference, November 7, at the Wade Hampton Hotel in Columbia.

Hawley S. Simpson, Arnold H. Vey, Harold F. Hammond, Earl J. Reeder, William A. Van Duzer, Harry H. Harrison, and Leslie J. Sorenson, were members of the Institute who presented papers at the Traffic Section of the Annual Meeting of the Highway Research Board in Washington, D. C., on Thursday, December 5.

Theodore T. McCrosky (Assoc. I.T.E.), will become Executive Director of Chicago Plan Commission in February, 1941. He leaves post of City Planning Director of New York City, Department of City Planning. In his new work he will direct study of a master plan for the city of Chicago.

They're In The Army Now!

During a recent trip to the United States Army Engineer's School at Fort Belvoir, Virginia, your Editor had an opportunity to observe first hand the activities of *Paul L. Ristroph*, (Assoc. I.T.E.), who has entered active service with the United States Army and is engaged in problems relating to United States Army motor transport. Captain Ristroph, a graduate of Louisiana State University and Bureau for Street Traffic Research, Harvard Univ., was formerly Traffic Engineer of the city of New Orleans. Also on active duty at Fort Belvoir engaged in problems relating to signs, signals and markings, was *Lieutenant Taylor D. Lewis* (Assoc. I.T.E.), who is on leave of absence as City Traffic Engineer of Gary, Indiana.

Los Angeles Opens New Highway

An event of great importance in California was the recent opening of the Arroyo Seco Parkway connecting with downtown Los Angeles, the northeast section of the city and Pasadena. This six-lane divided parkway represents an investment of approximately $4,000,000.00. This nine mile freeway connecting these two important cities will be a remarkable time saver for the business man, salesman and workman, there being no stops for boulevard stop signs, traffic signals or cross traffic as it underpasses 16 cross streets and railroads. Because it is free of left turn movements and lighted by modern illumination, the safety to motorists will be enhanced, while it still allows exits and entrances to the parkway at important points between terminals.

President Hoffman Addresses Annual Meeting of Automotive Safety Foundation

The automotive industry's five-year investment of more than $2,000,000 in the traffic safety program of the Automotive Safety Foundation has been paralleled by a continual decline in the nation's traffic fatality rate, President Paul G. Hoffman (Hon. mem. I.T.E.) told members of the Foundation at its recent annual meeting in New York.

The fatality rate has been reduced from 17.4 to 12 for every one hundred million vehicle miles, Mr. Hoffman said. "The successive reduction in rates translates itself into a saving of more than 48,000 lives, 1,700,000 injuries, and $1,600,000,000 of cash loss from accidents, against what would have prevailed if the 1935 rate had continued. . . . . In 1935 our passenger cars and trucks covered slightly more than 200 billion miles. We estimate that mileage will exceed 300 billion in 1940."

Major credit goes to two groups of public officials, he said. "First, to those concerned with making the best possible use of our existing highways and streets, and second, to those charged with the responsibility of providing us with safer facilities. Educators, enforcement officials, and motor vehicle administrators belong in the first group, and Public Roads Administration and highway commissioners and our highway and traffic engineers in the second.

"It has taken devotion and effort money could not buy to bring that accident rate down from 17.4 to 12. . . . Progress that has been made has been gratifying but we have no accasion for smugness or complacence. A rate of 12 is still unconscionably high. Five years ago I made the statement that the highway accident rate could be reduced one-third within five years and another third in an additional ten years. That means our rate of 12 is just double what it should be."

Conferences

FOURTH ANNUAL SOUTH CAROLINA STATE-WIDE SAFETY CONFERENCE, Columbia, South Carolina, Thursday, November 7, 1940. The papers presented at the Street and Highway Section included: "The State's Place in Street and Highway Safety," "The City's Place in Street and Highway Safety," "Reaction Time," "Motor Vehicle Inspection Law," and "South Carolina Street and Highway Safety Problems."

TWENTIETH ANNUAL MEETING, HIGHWAY RESEARCH BOARD. The Twentieth Annual Meeting of the Highway Research Board of the National Research Council was held in Washington, D. C., December 3-6. The following papers were presented by Institute members at the Traffic Section on Thursday, December 5: Report of Department of Traffic, Re-

port of Committee on Safety Approach Speeds at Intersections, Report of Committee on Sidewalks Along Rural Highways, Report of Committee on Sequence and Overlapping of Amber Indication in Traffic Control Signal Operation, Progress Report of Committee on Traffic Control and Protection at Urban and Rural School Zones, Report of Committee on Warrants for Pedestrian Walk Signals, Speed Studies in Connecticut, South Carolina, and California.

TWELFTH GREATER NEW YORK SAFETY COUNCIL CONVENTION. President Hawley S. Simpson has announced that the Institute of Traffic Engineers is acting as a cooperating agency with the Greater New York Safety Council for the Twelfth Annual Convention in New York City. One of the sessions sponsored by the Institute will be "Streamlining Our Existing Streets and Highways." A special committee of the Institute will be appointed to work with Mr. Light B. Yost (Affil. I.T.E.) in the development of this session. Mr. Yost is serving as Chairman of the Street and Highway section of the convention. There are plans to have a general traffic luncheon sponsored by the Institute in place of the dinner usually held by the Institute in past years.

Christmas Appeal

Check accidents off your Christmas list!

The National Safety Council made that appeal today to drivers and pedestrians throughout the nation in an effort to cut down the heavy December traffic toll.

Each year, the Council pointed out,

WHAT *Bonderizing* MEANS TO THE TRAFFIC SIGN

PROVING THE FINISH PROTECTION PROVIDED BY BONDERIZING

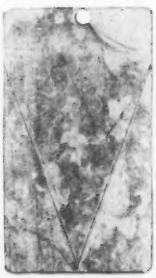


Fig. 1. A galvanized section finished with two coats of paint. Exposed in Florida 18 mo. Paint peeled from most of surface.

Fig. 2. A Galvanized and Bonderized section. Finished same as Fig. 1. Exposed in Florida 18 mo. Surface okay. Adhesion good.

Galvanized Armco steel — plus Bonderizing under the baked enamel — assures a rugged, long-time finish on Miro-Flex Signs. Bonderizing increases rust resistance and assures maximum adhesion for the enamel, preventing untimely chipping or peeling. Miro-Flex signs resist the effects of weathering.

THE MIRO-FLEX COMPANY - WICHITA, KANS.

the Christmas spirit of "Peace on Earth, Good Will Toward Men," undergoes an ironic transformation. It is converted by the very geniality and excitement of the holiday season into suffering and sorrow through wholesale slaughter on the streets and highways.

Thirty-two national organizations are joining the Council in the drive, which has a two-fold purpose.

Not only is it aimed at the blight on Christmas happiness, but it is a last-ditch fight to keep traffic fatalities this year from soaring far above 1939.

Last year 3,540 persons were killed in December traffic. All this year highway deaths have been running ahead of last year. This means, the Council says, that the nation will pile up one of its biggest holiday traffic tolls unless drivers carry the Christmas spirit onto the highways and pedestrians do their part by being extra careful.

Why does December invariably bring one of the heaviest traffic tolls —more than one and a half times as great as June, the safest month?

The Council blames bad weather, more hours of darkness and the Christmas rush. To thwart these traffic bugaboos, it suggests:

1. Don't drive if you drink.
2. Balance more darkness and bad weather with less speed and more caution. Start earlier.
3. Don't let the hustle and bustle of the holiday season make you impatient or careless when you drive or walk. Take it easy.

In addition to appealing to drivers and pedestrians, the Council is taking its campaign straight to governors, motor vehicle administrators and highway patrol chiefs, to mayors and police chiefs and to thousands of safety leaders.

"We hope everyone will enlist in this campaign to reduce traffic tragedy during the holiday season," said Col. John Stilwell, president of the National Safety Council. "Certainly there is no better way of expressing the Christmas spirit than by sparing others the grief of a traffic accident. No one can have a happy Christmas if he has an accident."

Look

Ohio Leads the Way

July 1, 1921, a new division of the Ohio Highway Department—a traffic engineering department, the first of its kind, was created. The program set up benefited not only every citizen of the Buckeye state, but out-of-state motorists who daily travel on Ohio highways.

Assigned to the traffic engineering department was the job of designing and installing a system of marking state highways, making traffic surveys and other traffic studies and handling of all matters pertaining to traffic control on the roads comprising the state highway system.

Until 1931 the new department had functioned as a minor, independent bureau of the highway department, cooperating with the bureaus of construction, maintenance and bridges.

In January of that year the department was made a part of the maintenance bureau. On November 1, 1939, Col. Robert S. Beightler, the present director of highways, established it as the Bureau of Traffic and Safety with equal rank to that of the original bureau.

Marking the state highways with route markers, warning signs and directions, together with numbering the roads of the state system was the department's first step.

The traffic department is now of

ELECTRIC SIGNALS

Standard signals adapted for all types of mounting. Synchronous and induction control mechanisms and accessory devices.

REFLECTOR SIGNALS

When signs are not enough or expense is a factor, reflector signals keep down both cost and accident rate.

10″ x 18″; Nine 1⅝″ Stimsonites

8″; Six 1⅝″ Stimsonites

15″; Six 3″ Stimsonites

REFLECTOR SIGNS

Large Stimsonized and standard reflector button signs for all traffic conditions.

60″ SIGN 18″ LETTERS

24″ SIGN 6″ LETTERS

DELINEATORS

Reflector Delineation gives essential road information after dark at daylight distances. The alignment and driving limits of the road are outlined by a channel of light.

SIGNAL SERVICE CORPORATION

SS SIGNALS

ELIZABETH, N. J.

age. It is a major bureau of the Highway Department. From one engineer, one draftsman and a stenographer in 1921, it has grown to an organization of 29 engineers, draftsmen, clerks and stenographers, two special field survey men, three men in the traffic signal installation and maintenance department and some 40 sign painters and laborers, all attached to the Central Office. There are also six traffic engineers and 192 men in the highway marking activities of the 12 different divisions.

Listen

Looking Ahead

February 19-21, Ann Arbor, Mich.: Twenty-seventh Annual Highway Conference. Traffic sessions, February 19th.

Mar. 6, Beaumont, Texas: Southwestern Industrial Traffic League, Edison Hotel, Beaumont, Texas. F. A. Leffingwell, Secretary, 1908 Santa Fe Bldg., Dallas, Texas.

Mar. 11-12, Philadelphia, Penna.: Seventh Annual Philadelphia Regional Safety Conference. (Bellevue Stratford Hotel.) Walter W. Matthews, manager, Philadelphia Safety Council, Chamber of Commerce, 12th and Walnut Streets, Philadelphia, Penna.

Mar. 31-Apr. 1, Boston, Mass.: 20th Annual Mass. Safety Conference. Lewis E. MacBrayne, general manager, Massachusetts Safety Council, 80 Federal Street, Boston, Mass.

Apr. 1-3, Pittsburgh, Penna.: Western Penna. Safety Council, 17th Annual Regional Safety Engineering Conference. E. J. Kreh, secretary, 704 Empire Bldg., Pittsburgh, Penna.

Apr. 2-3, Newark, N. J.: Seventeenth Annual Eastern Safety Conference. Fred M. Rossland, secretary-manager, Newark Safety Council, 24 Branford Place, Newark, N. J.

Apr. 15-17, Columbus, Ohio: All Ohio Safety Congress (Neil House). Thomas P. Kearns, superintendent, Division of Safety and Hygiene, Industrial Commission of Ohio, Columbus.

Apr. 22-25, New York City: Greater New York Safety Council, Twelfth Annual Convention and Exhibition. (Hotel Pennsylvania.) Greater New York Safety Council, Inc., 60 East 42nd Street, New York, N. Y.

May 6-8, Chicago, Ill.: Midwest Safety Conference. (Hotel Sherman.) Geo. G. Traver, manager, Greater Chicago Safety Council, 222 North Bank Drive, Chicago, Ill.

May 22-24, Norfolk, Va.: Seventh Annual Va. State-wide Safety Conference. (Monticello Hotel.) Wm. M. Meyers, executive secretary, Richmond Safety Council, 30 Allison Bldg., Richmond, Va.

Reports and Publications

REPORT ON A CITY-WIDE TRAFFIC SURVEY AND PROPOSED IMPROVEMENTS, Glendale, California, 1939-1940. This survey was supervised by the City Engineering Department, and under the technical supervision of E. B. Lefferts (Mem. I.T.E.), Henry K. Evans, (Jun. I.T.E.), and R. C. Hatton, (Assoc. I.T.E.), of the Public Safety Department of the Automobile Club of Southern California. This survey includes comprehensive field studies of many important phases of traffic activity, as well as studies of accident reports and court records of traffic apprehensions over a period of six years. Of special note is the recom-

AUTOMATIC SIGNAL CORPORATION

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TOKHEIM

FULL AND SEMI TRAFFIC-ACTUATED SIGNAL SYSTEMS. FIXED TIME CONTROLLERS AND SIGNALS. SPEED CONTROL SYSTEMS. VEHICLE COUNTERS. TOLL REGISTERS. RELAYS

"Traffic Regulation with Intelligence"

Norwalk, Conn. Chicago, Ill.

mendation, which appears on page 4, that "the office of City Traffic Engineer be created and filled by competitive civil service examination, this position to be in the City Engineering Department and under the direct supervision of the City Engineer." The report is in loose-leaf form, and its 144 pages are numerously illustrated.

MANUAL OF INSTRUCTIONS. This manual was prepared by the Department of Highways, Division of Traffic and Safety, State of Nevada, of which Bernard C. Hartung, (Jun. I.T.E.), is director. THE MANUAL OF INSTRUCTIONS constitutes the prescribed standards of design, construction and use of traffic control devices adopted by the State of Nevada pursuant to the provisions of the law and in consideration of the necessity for safe and efficient operation of vehicles on the highways. These signs and markings adhere as closely as possible to the standards advanced by the American Association of State Highway Officials. The manual is in a loose-leaf binder and its 143 pages are beautifully illustrated.

FACTS ABOUT TRAFFIC ACCIDENTS IN SOUTH CAROLINA, 1939. This booklet was compiled by the Traffic Engineering Division of the South Carolina State Highway Department of which Wilbur S. Smith, (Assoc. I.T.E.), is Traffic Engineer. It is a comprehensive report of motor vehicle traffic accidents in South Carolina. The Traffic Engineering Division has utilized the most modern and progressive statistical processes and methods of accident collection and analysis in preparing the report. Graphic illustrations have been used to supplement data and depict results. The applications of many summaries and comparisons are enhanced by facts and figures furnished by the Statewide Highway Planning Survey.

CORDON COUNT DATA ON THE CENTRAL BUSINESS DISTRICT OF CHICAGO, October 1940. This booklet gives information on the traffic characteristics of the Central Business District of Chicago. Unusually extensive surveys, made in May of this year, have been reduced to a number of simple charts with brief interpretive statements. Analyses are also presented of the transportation trends over a period of years. The basic material for this booklet was made available through the efforts of the City of Chicago, Department of Public Works, and the Chicago Association of Commerce Street Traffic Committee of which Robert H. Nau, (Mem. I.T.E.), is secretary.

TRAFFIC FATALITY ANALYSIS, City of Los Angeles, 1939. This report was prepared by the Street Traffic Engineering Bureau of Los Angeles of which Ralph T. Dorsey, (Mem. I.T.E.), is Traffic Engineer. The pamphlet presents a compilation of facts showing the value of sodium vapor lighting and traffic facts as they relate to the City of Los Angeles for the year 1939. Diagrams report the trend of the different age groups and types of fatalities.

RESOLUTIONS ADOPTED, State of New Jersey, 1940, at Fourth Annual New Jersey Street and Highway Safety Conference. These resolutions urged the President of the United States to direct the inclusion of highway lighting in our national defense program and also that the legislature of the State of New Jersey be requested to arrange a sum in excess of six million dollars annually to be returned to the counties for safety facilities and that a survey be made by the New Jersey State League of Municipalities to determine the importance of the night accident problem and the sum of money necessary for the solution of the problem.

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State Owned Motor Vehicles Favored for Long Distances

State owned cars for field men who do considerable traveling during the course of a year are much cheaper than private cars operated under a travel allowance system and are therefore preferred, according to a study by the Research Department of the Kansas Legislative Council. The study disclosed that at annual mileages of from 20,000 to 26,000, the saving on state owned cars as against private cars operating on a 5 cent per mile travel allowance amounted to more than 2 cents per mile.

A few years ago, Kansas passed a law providing that various state agencies must provide cars to those persons who travel 18,000 miles or more a year, and may provide cars to those persons who travel more than 12,000 miles a year. The law placed the maximum mileage allowance rate for private cars at 5 cents per mile of travel.

Slow Moving Trucks Regulated by State Action

Slow moving trucks are being regulated in at least four states to relieve highway congestion and resulting dangers. Definite performance standards have been established which all trucks must meet. Iowa requires that all trucks must be able to negotiate a 3 per cent grade at 30 miles per hour; a Michigan law states that trucks must be able to ascend any grades encountered on their regular runs at 10 miles per hour; Rhode Island makes 20 miles per hour on a 4 per cent grade its standard; and South Carolina demands 20 miles per hour on a 5 per cent grade.

Week-end trucking is regulated in the states of Minnesota and Wisconsin. Minnesota prohibits the operation of trucks within 35 miles of first-class cities between 9:00 A.M. and midnight on Sundays and legal holidays, from May 30 to the second

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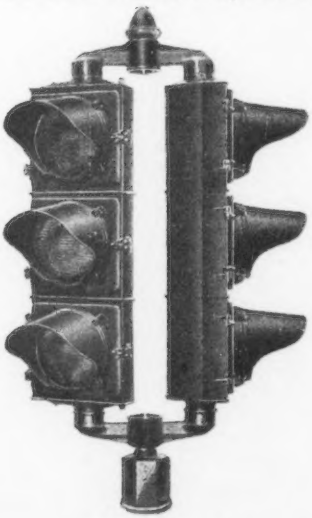

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Sunday in September. The Wisconsin regulations which vary from year to year are issued through the Public Service Commission. They usually apply between Decoration Day and Labor Day. Exemptions to these state restrictions are given to trucks of one ton or less rated capacity and to those transporting perishables, newspapers, and certain other commodities.

Red Concrete Highway Construction Solves Slow Traffic Problem

The problem of slow vehicular traffic ascending the two-lane highways over the hills of Tennessee has been solved by constructing a third lane of red concrete. The extra lane for slow traffic is placed on the right-hand upgrade side of the highway and is constructed of concrete colored red with iron oxide. A large sign on the pavement at the foot of the grade directs all slow traffic over into the red lane.

This novel construction was carried out as an experiment by the State Highway Department on some two miles of highway on which a grade of about six per cent and a series of horizontal curves limiting the sight distance made it a traffic hazard. Previously, fast traffic would pile up behind trucks ascending the hill. In some instances, serious accidents occurred when impatient drivers attempted to pass the trucks in the face of down-grade traffic.

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Frankly Speaking

Traffic Engineering – a necessity

THE field of traffic engineering has broadened immensely in the last few years and with it the point of view of the traffic engineer and the objective and importance of his work. Traffic improvement involves the use of engineering, education and enforcement. As a matter of practical necessity all three methods of approach must be utilized.

There are two fundamental phases to the problem, namely, (1) safety of movement, and (2) facility of movement. At first glance the full significance of the foregoing simple terms—safety of movement and facility of movement—may not be realized. But in the final analysis, all effort or money expended for traffic—whether for traffic education, traffic engineering, or traffic enforcement—is actually being expended solely for the purpose of attaining safety of movement, facility of movement, or both.

Attainment of the first objective, safety of movement, would result in a minimum of accidents—both personal-injury and property-damage; attainment of the second objective, facility of movement, would result in the relief of congestion and delay; while the solution of both problems would effect a minimum of mental and physical fatigue, and a maximum of economy and efficiency.

To repeat, traffic improvements involve engineering, education and enforcement. That the economic value of traffic engineering may be utilized to its fullest extent, a balanced traffic improvement program must include all of these methods of approach.

It is because the traffic engineer has recognized the bearing of each of these factors on his job, and has mastered the technique which they involve, that he is entering a far wider field of usefulness. He is no longer a mere technical investigator and advisor for the regulatory and enforcement authorities. He has become an essential factor in all community planning undertakings. In our specialized economic society in which highway transportation is the great integrating and correlating element, the function of the traffic engineer will have increasing importance. His activities and the acceptance of the essential character of his services will be based in the future as they have been in the past on the economic value of these services to the community.

D. Grant Mickle

V. Pres. Institute of Traffic Engineers

ENGLISH HIGHWAYS — A STUDY IN CONGESTION

By Lawrence B. Tipton

Editor's Note:

This article is a statement of facts as observed by the author on a trip to the British Isles just prior to the European conflict. It is written with the hope that in pointing out the stumbling block traffic congestion has been for England during peace and now during these critical times, that we in America will not let conditions like this exist or occur here.

CROSS roads, bottle necks, and blind corners.

There you have a capsule description of English highways. All types of traffic intermingle at varying speeds. Small cars, horse carts, bicycles, and the usual stream of motor vehicles and vans unite to make England's major traffic problem one of congestion.

News reels depict the type of congestion which slows up London traffic. Horse-drawn newspaper vans used to take from seven to ten minutes to get from Piccadilly Circus to Oxford Circus. Now, the motor-driven vehicle, many times faster, frequently takes twice that much time. The average speed for horse-drawn buses in Central London was six to seven miles per hour. Today's motor bus schedules show no great increase in averaging from seven to nine miles per hour.

A motorist can make the entire northern circuit of London, from Chiswick to Ilford, 23 miles by the North Circular Road, in less time than it takes to thread through traffic on the direct road of only 15 miles.

Thus England has the paradox of swifter vehicles and slower traffic. The English realize that their roads, built under local control for local traffic and the now almost forgotten horse, are generally unfit to meet the requirements of modern transportation and war.

Their traffic statistics show a greater density of vehicles per mile of road than any other country. For the past three years, licensed mechanically propelled vehicles have been increasing by nearly 500 a day. The numbers recorded in London at Marble Arch on a single day rose from 38,000 in 1931 to 60,000 in 1935 and at Hyde Park Corner from 69,000 to 83,000. Despite this increase of approximately 25 per cent since 1931, the total road mileage has increased only 1.5 per cent since 1910. It is apparent that the nation's most valuable servant is being strangled to death slowly for lack of space in which to grow.

The trunk roads leading out of London exhibit characteristics which do not relieve the situation. The Bristol Road, 120 miles long, varies in width 19 times, from 20 to 40 feet. The Great North Road can carry only a

British Highway Toll Fourth of Air Raids

LONDON, (A. P.) — British highway accidents are killing one-fourth as many persons as air raids, it was officially disclosed today.

Frederick Montague, parliamentary secretary of the Transport Ministry, said that 1,146 had died in motor accidents last month, as compared with 4,588 dead in air raids.

A little more than half the total of November victims were killed during air-raid blackouts.

In fifteen months of war, Mr. Montague said, 11,424 persons had been killed on roads, an increase of 3,141 over the fifteen months preceding the war.

N. Y. Sun—Dec. 19th, 1940

single line of traffic each way for nearly two-thirds of its total length. The London-Birmingham Road, 110 miles long, has 23 types of surface. The Great West Road, hailed at the time of its reconstruction as the last word in road-building, is highly dangerous because of bad crossings and ribbon development.

The English are fully aware that road reconstruction is essential to public safety and national defense, as proved by a number of studies which have been made on the problem.

The Oxfordshire County Highways Committee found, as the result of investigations over a three-year period, that 59 per cent of the accidents on roads under its supervision could have been prevented by the removal of ordinary road defects, and 78 per cent by the realization of an ideal scheme of modern layout. The rural sections of the five main roads of the county were improved, with the result that fatalities in Oxfordshire were reduced by 44 per cent in a single year.

The Lanarkshire County Council found that on the length of the Glasgow-Edinburgh Road divided into dual carriageways, accidents were 80 per cent less than on the single carriageway section, despite the fact that the volume on the dual carriageway section was 34 per cent greater.

The chief engineer of the Roads Department of the Ministry of Transport has stated that, following the construction of roundabouts at 23 selected places, the number of accidents at those places fell by 36 per cent.

The Ministry of Transport's recent analysis of 100,000 road accidents shows that 40 per cent of the accidents occurred at junctions, and of these, 35 per cent at uncontrolled junctions. Non-motorists were to blame for at least 54 per cent of the total accidents. The memorandum on this analysis enjoined that major traffic routes, where practical, should be rendered completely independent of local roads by being carried over or under them by bridges or subways. Where this was not practical, it advocated staggered crossings, or roundabouts.

The sum of these findings shows that the majority of accidents in England are the fault of the roads or the non-motorists, and not the driver, and that road improvement must be the major step toward reducing the toll of traffic deaths.

Even though this serious condition of congestion on English highways has caused many traffic mishaps in peace time—it is today, during war, a major disaster.

An original article by Lawrence B. Tipton, Head, Bureau of Public Safety, Rutgers University. (Affil. I.T.E.)

HAPHAZARD VS. PLANNED PARKING

SOME three decades ago major merchandising establishments and offices were centrally located, or, in the larger cities, concentrated in a central business district. This was due primarily to the methods of transportation then available. A large proportion of persons entering the business district either came by mass transportation vehicles or lived close enough to the center of the city to walk to and from their places of work, and to do their shopping. The central business district was the shopping center of the city.

But as the number of private passenger automobiles became large, the whole character of the city changed. Places of residence increasingly dispersed over a much wider area in all directions from the city center. Mass transportation was then unable to serve as effectively this greatly expanded area. Neither did it seem necessary that it do so. Greater and greater numbers of automobiles began to move

into and out of the cities, and traffic congestion increased.

As a result of these conditions, cities now face a serious problem of inadequate parking and terminal facilities. However, further analysis has shown that this is not a single problem. Instead our parking difficulties involve a number of interrelated problems, the solutions of which may be quite different. In facing these different problems, it is essential to bear in mind that the attitudes, desires and customs of motorists and other groups of people must to a major extent govern plans for improvement; or education must be invoked to produce acceptance of needed changes.

Cities must decide what their objectives really are in dealing with what we call the parking problem. They cannot, for example, hope to provide all-day storage space for every daily worker in the central business district who might like to make the daily trip in his automobile. Hence, intelligent solutions require consideration of and decisions concerning numerous factors which deal with the nature of the problem as a whole.

At its 1937 Annual Meeting the American Automobile Association recognized that parking was one of the major problems of urban automobile use. It also realized that this problem was not receiving the attention which it warranted. Efforts to deal with the problem too largely involved the idea that if the correct curb regulations were found, a solution would result. Thus the approach to the problem was far too narrow.

As a result, conditions were steadily worsening and motorists were increasingly expressing their dissatisfaction with parking conditions. Realizing that study was necessary to develop basic facts, principles and practical proposals for improving parking conditions, the AAA Committee on Parking and Terminal Facilities was appointed to direct the study.

First a proposed plan for the study was formulated and considered at the initial meeting of the Committee. It was decided that the first study should be majorly limited to the problems of the central business district. It was also decided that the next step would be to conduct, in cooperation with AAA Clubs, a questionnaire inquiry among traffic engineers and other city officials, merchants, parking lot and garage operators, and real estate and planning officials. All obtainable published reports — such as traffic and parking surveys and technical reports on the subject — were reviewed and useful information was utilized. During later stages of the Committee Program, field studies were made in typical cities, and interviews were held with many interested specialists.

Summaries of significant findings and data were sent from time to time to Committee members and Committee meetings were held to discuss these and the progress of the study. The last meeting of the Committee was held on October 22, 1940.

At this time there is being presented only a highlight summary of recommendations resulting from the Committee's work.

Recommendations

1. It is recommended that cities make factual studies to "take stock" of present parking conditions and to provide some measure of the demand for new and improved parking facilities. Traffic and planning engineers and other city officials agree that any plans for future development must be based upon complete basic facts if such developments are to serve the best social and economic interests of the community.

2. Cities must determine policies with regard to short-time parking, all-day storage, loading and unloading, requiring provisions for parking facilities in certain types of future buildings, mass transportation, etc., in order to set up proper objectives for

parking improvement programs. They must not only secure their own basic facts concerning present transportation and parking practices, but they must also appraise desires of people with regard to transportation and parking. In addition cities must decide what results they wish to secure in the future—how they intend future parking improvements shall affect future development of the central district and the city as a whole. Cities can then intelligently devise plans and programs for achieving such objectives.

3. It is recommended that all plans for city development include adequate consideration of the parking problem. Forward-looking city plans calling for the expenditure of money for mitigating traffic congestion—such as for the construction of express streets and highways, grade separations, widening projects, etc.—should also consider the effects of inadequate parking facilities upon the ultimate objectives of the entire plan.

REVISED RECOMMENDATION NO. 4

4. The committee has studied experience with parking meters in 55 cities responding out of 105 to which questionnaires were sent, and recognizes that when meters are to be installed, such installation should be only by proper and legal methods, and such meters should not be used,

a—where the demand for curb space is so limited that no serious parking difficulties arise,

b—where parking should be prohibited because of interference with important traffic movement or because the curb space is needed for more important uses such as bus stops and loading space, and

c—for the purpose of obtaining revenue. In fact, the meter fee should be limited to that which is necessary to amortize fair costs, maintain the devices, collect the money and enforce the regulation.

5. It is recommended that more attention be given the provision of parking facilities off the street, rather than continuing to place major emphasis on curb parking, as is done in many places. While it is recognized that full and appropriate attention should be given to curb parking, and that curb use can and should be improved, the ultimate solution to the downtown parking problem, particularly in the larger cities, lies in the use of space other than on the street.

6. The Committee recommends that city officials develop plans for more effective use of present off-street parking facilities. It has been shown that off-street spaces are not used to capacity. Their increased use would improve present conditions. Incomplete utilization is presumably due to fees greater than motorists are willing to pay, considering the conveniences and protection offered.

7. The Committee recommends that the location and size of parking lots be subject to public control in the interest of the parker as well as the general public. Parking lots uncontrolled as to size and location have frequently been found to increase traffic congestion and to have an adverse effect on property values. These objections could be obviated by requiring the location and size of parking lots to be subject to approval by the Board of Zoning Adjustment (or Zoning Appeals) under conditions and standards set up by the local legislative body in the zoning ordinance itself. One condition should require a report from the Planning Commission as to conformity with a thoroughfare plan and other elements of the city plan. Another possible method of public control would be by licensing regulations. It is believed that control by licensing procedures set up by city ordinance is less desirable than control through proper zoning regulations.

8. It is recommended that ordi-

nances be enacted to require either off-street loading or non-peak hour loading. Such ordinances would have to take into consideration the physical and traffic patterns of the city. Such loading requirements should be imposed only on heavy-traffic or congested narrow streets. It is further probable that such ordinances would have to define the types of merchandise, either by weight, or bulk, or the type of delivery vehicle, or both.

9. The Committee recommends that merchants whose business establishments attract large numbers of customers who come by automobile provide, individually or collectively, off-street parking facilities for such customers. Such facilities can be self-supporting if small hourly charges are made for parking. Even if space is provided free, the benefits to the business and to the central district as a whole—to which every merchant desires to attract all of the business possible—may easily be worth the cost, if information received by the Committee is representative.

10. It is recommended that more consideration be given to zoning restrictions in central business districts so as to use land less intensively and more appropriately by placing stricter limitations on building heights, bulks, and uses and by limiting the density of population. Most state zoning enabling legislation authorizes such control, but standards of building bulk and population density have not been strict enough. The concentration of too many persons within the limited area of central business districts has created the present parking problem with ensuing economic loss and social disorder.

11. Since financing is one of the major obstacles to a broad program of parking improvement, it is deemed appropriate to recommend that cities study the problem of re-securing tax revenues which have declined because residents and business establishments have moved outside of city limits.

12. It is recommended that the proper agencies in the larger cities examine their building codes, zoning ordinances and other regulations which may apply to ascertain if the low-cost, open-deck or other inexpensive type of parking garage can be legally constructed. If it cannot, it is recommended that suitable corrections be made in local ordinances.

13. At the meeting of the Committee on October 22, 1940, it was proposed that the final report should be designed for semi-popular use, should contain as many helpful photographs, charts and diagrams as possible, and that all strictly technical information should be placed in appendices.

14. The Committee at its last meeting also recommended that suitable plans including field service, be devised to promote local study of parking problems and to encourage and assist in the development and carrying out of plans and programs for parking improvement.

Condensed from the Report of AAA Committee on Parking and Terminal Facilities, submitted to the Thirty-Eighth Annual Meeting of the AAA, Washington, D. C., November 1940.

ROAD COSTS IN NEW JERSEY

By MERRILL M. FLOOD

MORE than a million motor vehicles registered in New Jersey are served by the twenty-seven thousand miles of roads and streets constructed and maintained by the state and its political subdivisions. As an arterial route connecting New York City and Philadelphia, this highway system is also subject to heavy interstate traffic.

The costs of this road system have been met, in the main, from revenues derived from local property taxes, the

state gasoline tax, motor vehicle license fees, and driver's license fees. This is the method of finance which has developed in New Jersey over a period of years, and in most other states, as the natural way to assess property owners and highway users for the benefits which they receive through the use of these traffic routes.

Considerable criticism has been directed at the public officials responsible for the financing of this important governmental service. These critics hold that:

1) The highway user is not paying a proper share of the total cost.
2) The allocation among highways is not equitable.

An examination of the objections which have been raised shows that there is much to be said on both sides of this argument. It shows also that even the most intensive and impartial study is not apt to yield an ultimate and conclusive solution to the dilemma.

The State and Local Government Section of Princeton University, more popularly known as the *Princeton Surveys*, has recently completed a research study of the problems of allocation of road costs in New Jersey among the highway users and other taxpayers. The result is an indication of the amount required to finance New Jersey's road system each year and a suggestion concerning a method which might be used to determine the sources of revenue in a manner treating all taxpayers fairly and equally.

It is impossible to determine, from existing records, just how much has been expended in New Jersey for the construction and maintenance of its roads and streets. As a practical matter, all costs, beyond those met from receipts of taxes on highway users, will be paid for as they arise from revenue derived from the local property tax. It is sufficient, therefore, to know the financial responsibility of the highway user in order that his share may be assessed against him each year.

The *Princeton Surveys*' approach to this problem is based on the assumption that the highway user should pay for all costs of road improvements made necessary by his motor vehicle. His responsibility, under this notion, is thus limited to the construction and maintenance of the road surface itself and does not include costs of right-of-way, extra width of city streets provided principally for parking purposes, and other such costs which are not essential in providing free and easy movement of through traffic.

An estimate of the cost of improving roads beyond the point necessary for simple access may be made on the basis of the mileage of roads now in existence, using unit costs for such improvements, as determined by actual practice in each of the counties. For the various types of roads involved, these unit costs are shown for several counties in the table following.

TABLE 1
Typical Costs per Mile for Improving Roads to Types Listed from Preceding Lower Types

County	Gravel	Bituminous Penetration Macadam	Bituminous Concrete	Reinforced Concrete
Bergen	$	$20,605	$26,837	$71,572
Camden	4,709	17,516	.....	41,704
Cumberland	3,612	.....	18,154	38,523
Essex	....	34,056	23,196	49,047
Hudson	....	.....	.....	117,210
Middlesex	3,207	7,248	22,346	30,985
Monmouth	2,725	.....	12,127	.....
Sussex	5,603	26,279	.....	58,562
Warren	6,091	.....	16,708	27,484

When these unit costs are applied to the present mileages, the total cost of construction, including structures, engineering, and administration, on all municipal and county roads is found to be some $357,000,000. When this amount is amortized using a twenty year service life and a 4% interest rate, and when the known cost of the state highway system is included, the resulting total "annual capital cost" amounts to $48,835,000. Adding to this the estimated annual cost of maintenance, there is obtained a total annual cost on all roads and streets in New Jersey of $60,734,000. It must be emphasized again that this amount does not include the cost of any unimprovable roads and includes only those costs for all other roads and streets necessary for improvement beyond that adequate for a simple access road. As a check on this method of determining total annual cost, the unit costs given by Bruce in his book, *Highway Design and Construction,* is found to be, using the same amortization principles, some $68,800,000 which compares reasonably well with the amount described above.

In 1938, the total amount which was collected from taxes on highway users, including drivers' license fees, was $40,269,000. Without placing too much confidence in this method of determining the aggregate amount which highway users might reasonably be expected to pay through motor vehicle taxes and fees, it will be interesting to compare various alternative methods for distributing this total amount among particular classes of motor vehicles.

One method of relating cost to use is to determine the amount which each vehicle owner would pay if all paid the same amount per ton mile. This measure of use has the merit of simplicity and familiarity and it has been used in some states, for example, Kansas and Iowa. A more reasonable measure of responsibility appears to be the square root of maximum wheel load times number of miles. This "root-load-mile" index has been suggested as a fair measure of annual cost because many elements of total cost vary with the thickness of surface required, which engineers have generally taken to be proportional to the square root of the load which the surface is designed to carry. For purposes of illustration, a total annual cost of $50,000,000, when distributed among the motor vehicle users registered in New Jersey in 1938, results in annual costs for certain vehicles as shown in Table 2, following, where estimates of the amounts now paid for each of these vehicles in the form of gasoline taxes and license fees are also shown for purposes of comparison.

The amounts shown in table 2 depend on necessarily crude estimates of average annual mileage, gasoline consumption, and actual maximum loads, but they indicate, in a general way, the nature of the differences between the present system of allocating costs and the two alternatives shown.

The *Princeton Survey* made every effort to obtain an answer to the two objections which have been raised to the present system of allocating road costs among the taxpayers of New Jersey. The result, however, is little more than an indication of the effects of the alternatives considered, but this may serve as a guide to public officials charged with the responsibility of determining the structure of road finance in New Jersey.

While the study was in progress a number of conferences were held with representatives of the highway users, the railroads, the petroleum industry, the state legislature, and governmental agencies. It is extremely significant that no agreement could be reached in these conferences, either on the general problems involved or on the methods of the specific alternatives

considered. In order that sensible action may be taken concerning the financing of New Jersey's road system, it will be necessary for the legislature, in the light of these findings, and with the help of the property taxpayers and highway users, to decide on the policy which New Jersey may best follow in dealing with this important and difficult issue.

An original article by Dr. Merrill M. Flood, Director, Statistical Section, School of Public and International Affairs, Princeton University.

TABLE 2

Motor Vehicle License Fees and Gasoline Taxes

Comparison of Typical Payments
Under Present System with Two Alternatives

Class of Vehicle	Typical Payments					Class Average		
	Fees	Gas Tax	Total Present	Root Load Mile	Ton Mile	Annual Mileage	Maximum Miles Wheel Load	per Gallon
Passenger Car	$11.30	$17.43	$28.73	$38.91	$32.70	8,691	3000	14.96
Buses								
School								
5,000	24.00	15.20	39.20	40.57	32.23	5,886	3000	11.62
17,000	60.00	35.22	95.22	74.81	111.93	5,886	6375	5.01
Contract Carrier								
20 Passenger	30.00	45.63	75.63	99.94	128.44	9,810	4125	6.45
50 "	80.00	75.63	155.63	147.60	271.44	9,810	8000	3.89
Common Carrier								
20 Passenger	30.00	140.07	170.07	306.80	394.31	30,116	4125	6.45
50 "	80.00	276.75	356.75	540.21	993.47	35,904	8000	3.89
80 "	140.00	375.81	515.81	684.49	1547.98	36,639	8000	2.92
Farmer Commercial								
4,000 lbs.	10.00	5.55	15.55	16.03	10.71	2,600	3000	14.08
10,000 "	19.50	23.22	42.72	56.91	60.59	5,837	3750	7.54
21,000 "	36.00	67.29	103.29	144.13	224.12	10,202	7875	4.55
Private Trucks								
4,000 lbs.	20.00	11.07	31.07	32.06	21.41	5,199	3000	14.08
10,000 "	39.00	46.41	85.41	113.81	121.18	11,674	3750	7.54
21,000 "	72.00	134.58	206.58	144.13	448.13	20,404	7875	4.55
30,000 "	99.00	196.80	295.80	198.36	735.42	23,494	8000	3.58
For Hire Trucks								
4,000 lbs.	20.00	33.00	53.00	91.94	64.97	14,911	3000	13.55
10,000 "	39.00	90.54	129.54	208.01	243.83	21,336	3750	7.07
21,000 "	72.00	203.43	275.43	405.36	701.40	28,693	7875	4.23
30,000 "	99.00	298.74	397.74	558.25	1157.78	33,059	8000	3.32
For Hire Trailers								
10,000 lbs.	39.00	87.99	126.99	208.01	233.71	21,336	3750	7.27
21,000 "	72.00	197.94	269.94	405.36	673.59	28,693	7875	4.35
30,000 "	99.00	291.57	390.57	558.25	1116.80	33,059	8000	3.40

A WORD TO THE WISE — MOTORIST

By BERNARD C. HARTUNG

A WORTHWHILE program that has been given only sparse recognition in the field of traffic control is that of the application of word markings or messages to the roadway surface. For several years, highway engineers and other officials have been closely studying this situation. And, at the present time, there is being standardized or, at least, favored a type of highway word or symbol marking that is proving singularly effective. It is the elongated, rounded or half-block style, designed to warn motorists of such danger spots as school zones, railroad crossings, stop lines and pedestrian crossings.

Although this method of labeling

the pavement surface has been employed for some time, it was not realized until recent years that the words should be so designed as to offer the greatest visibility to the driver himself. Such prominence is necessary in order to arrest or command the attention of the vehicle operator. As early as 1934, Professor Charles Tilden of Yale University realized that the angle of vision from the driver's seat necessitated a change in the actual form of the letter or symbol. After considerable study, he arrived at a design which, in principle, emphasized or widened the horizontal lines. Accordingly, most states at the present time not only elongate pavement copy but increase the width of the horizontal portions of each word or symbol. This tends to give the wording a normal appearance from the driver's position and assures detection for an appreciable period previous to the point of danger.

In cities and towns where the conspicuous placement of shoulder or curb signs is difficult, many engineers believe that pavement markings are the only remedy for the situation. It is granted that the average motorist will have to be educated to conscientious observances and proper recognition of these markings, but most authorities point out that this will come in due time, particularly when the value and significance of such treatment is fully realized.

A major objection in the past was predicated on the fact that it has been difficult to discern such markings after dark. The recent development of glass spheres or beads which, when imbedded in the paint or binding agent, give them luminous quality, has dispelled these objections. It is also found that the addition of these reflecting units tends to prolong the life of the marking from eight months to one year. Another problem that usually faces the traffic engineer or paint foreman is the color or type of lacquer or paint that will prove the most effective, both from the standpoint of color contrast and wearability. As regards the first, the most satisfactory colors are white or federal yellow, regardless of the type of pavement surface. The former is more predominantly used and offers a more direct contrast with the roadway under both daytime and nighttime conditions. For the best results, it is advisable to apply an undercoating of black tar paint previous to the laying down of the pavement marking itself. This procedure adds to the life of the treatment and tends to create a more favorable contrast. It is recognized that ice and snow will, in many cases, obliterate and make useless pavement markings or symbols. However, since most of this type of highway labeling is used near urban centers or on heavily traveled roadways, this problem is not insurmountable. Practically all of these sections are regularly cleared of snow and ice by ploughs and the traffic itself helps to remove the remaining layers of ice and snow. Some of the northern states naturally have more difficulties in this respect but, as a general rule, this type of treatment is effective during 10 or 11 months of the year.

The use of pavement markings on both rural highways and urban streets is but another effort of the highway department and traffic engineers to adequately serve and guide the driving public. The treatment goes hand in hand with center lining and the use and application of roadside signs or devices. It is hoped that, in due time, all of these practices will be standardized, that is, brought to that point where the motorist, regardless of where he may be driving, will be familiar with the markings, signs, signals and striping measures.

Taken from an article appearing in the December 1940 issue of ROAD BUILDERS NEWS by Bernard C. Hartung, Director Safety and Traffic Division, Nevada State Highway Department. (Jun. I.T.E.)

TIME ZONE STUDIES REVEAL REAL BOTTLENECKS

By WORTHAM W. DIBBLE

A VERY important factor that concerns a vast majority of the traveling public and the officials of the War Department is the time element in highway transportation and travel. Time, speed and safe arrival at a predetermined destination are vital for efficiency in any undertaking and especially in our preparedness efforts in this national crisis. In order to eliminate bottlenecks and consequent delays on our highways and streets, the traffic engineers, or as some people prefer to call them—the transportation experts, should through proper coordination and cooperation with other public officials make rational and fact finding time zone studies with a view to relieving traffic bottlenecks by control and regulation, or by reconstruction.

Time zone studies are conducted by several different methods. In the collection of motor vehicle running time data, one method well adapted to rural areas is to record the license numbers of the passing vehicles and the time that they pass a given point. By recording at another station the same license numbers and the time that they pass the second station, and comparing the readings, the elapsed time may be determined. For accurate results the watches used at both stations should, of course, be synchronized.

In the event that sufficient recorders and funds are available, more than two stations are desirable, deployed along the given route, and thus a more comprehensible result can be obtained. This is particularly desirable for studies in rural areas where the volume does not play as important a part in the "bottlenecking" as it does in congested areas.

Time studies on streets with large traffic volumes are hard to record by this method and a method generally used on such streets with heavy volumes of traffic is the one known as the "floating car" study. This employs a car entering traffic and moving with the traffic, normally from some central point to various destinations, both far and near, and recording the results. Care in choosing the driver is important and the driver should be one who is not inclined to drive too slow or, on the other hand, take unnecessary risks in driving too fast. This type of study is accomplished by a recorder within the car taking down elapsed time and distances. Speed is easily computed therefrom. Both urban and rural streets or highways are suitable for this type of study.

Another method more generally adaptable to a wide range of conditions is one that has not been used very extensively. This method makes use of an instrument[1] for recording all of the data, and thereby eliminates the error of manual recording. The instrument records speed, time, distance, delay, and speed changes. These instruments can be operated by hand or they may be attached directly to the test vehicle. The record of the automobile's operation is made on a chart, rotating at a constant rate of speed in a clockwise direction. In the end this type of recording for time zone studies may be cheaper than the manual methods in which it is necessary to employ a recorder in addition to the driver in the "floating car" method. Perhaps this method of instrument recording will be used more extensively in the future.

Traffic bottlenecks! The drivers of U. S. Army transports are familiar with them—the pedestrian on the corner trying to cross the street and the

[1] One instrument is the Toronto Traffic Meter, described in the November 1940 issue of TRAFFIC ENGINEERING.

worker going to and from his business fully realize what bottlenecks are and what they mean in lost time.

Briefly, a few of the most common causes of bottlenecks are double parking, angle parking on narrow streets, center lane travel on a four lane road, ill timed stop-and-go traffic signals, narrow bridges, steep grades, and even some curves.

Time zone studies soon point out the bottleneck. The loss of several seconds per vehicle for a large number of vehicles runs into real money over an extended period of time. Efficient and scientific use of time zone studies if employed will provide for the proper solution.

Unless the problem is one of relocation and reconstruction, the traveling public can aid tremendously in relieving bottlenecks if they cooperate by abiding by the rules and regulations set forth. If such is not the case, then the entire responsibility for the elimination of detrimental bottlenecks rests upon the public officials.

During the next few years, with the growing national defense and preparedness program, a number of additional traffic bottlenecks will develop and they will have to be eliminated. It is believed that the Army will require it. Day by day, more and more motor vehicle equipment is being purchased by the Army, and as trainees are enlisted or drafted they will be using the streets and highways for hikes, overnight trips, and maneuvers, as well as for lines of communication and supply. As a matter of fact, one factor which already is reaching serious proportions is the development of new bottlenecks in and around towns where large extensions are being made in plants engaged in war order contracts. If adequate studies are made of traffic facilities in these areas the findings should go a long way toward eliminating the chances of creating bottlenecks in extension of highway facilities, which undoubtedly will be done in a large number of cases.

Time zone studies on all public through ways should be started by city and state traffic engineering divisions, and as points of congestion are ascertained, means for eliminating them should be immediately recommended and the recommendations carried out.

The Highway Traffic Advisory Committee to the War Department will, no doubt, play a large part in sponsoring such recommendations.

An original article by Wortham W. Dibble, Acting Traffic Engineer, South Carolina State Highway Department. (Jun. I.T.E.)

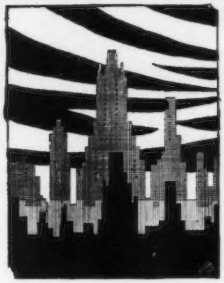
TRAINING PROGRAM CREATES TRAFFIC PROBLEMS

REGULATING the flow of traffic at Fort Sill Military Reservation in Oklahoma has become a difficult problem since January 1, when 40,000 to 50,000 men have been quartered at the fort.

The Oklahoma Department of Public Safety has mapped out plans which will include standard road signs at the fort, as well as the marking of through streets, installation of parking lots, laying of sidewalks, bus stop regulations and the enlargement of playground facilities for children of officers and reservation visitors.

If possible an investigating squad will be organized and regular traffic reports made, including an accident location map to enable authorities to offer better protection and control at danger spots.

Taken from the January 1941 issue of PUBLIC SAFETY.



Stop, Look and Listen

Stop

McCroskey Receives New Appointment

Theodore T. McCrosky (Assoc., I.T.E.) for the past two and one-half years Planning Director of the Department of City Planning, New York City, has resigned to accept the position of Executive Director of the Chicago Plan Commission.

Mr. McCrosky is a graduate of Yale University and the University of Louvain, Belgium.

After four years as instructor of engineering mechanics at Yale University, Mr. McCrosky was employed by the Regional Plan of New York and its Environs in the preparation of reports on traffic, transportation and city planning. There he was associated with Ernest P. Goodrich (Mem., I.T.E.), by whom he was employed in 1929 and 1930 as Resident Engineer in the replanning of the City of Nanking, China. Upon his return to this country, Mr. McCrosky was appointed Planning Director of the City of Yonkers, which position he resigned to become Planning Director of New York City. In that capacity he was charged with the preparation of certain phases of the long range Master Plan which has recently been released to the public.

Congratulations!

White Plains, New York, has a distinct honor of being the smallest city in the United States to employ a full time Traffic Engineer. Mr. Richard Siver, former City Planning Engineer of New Brunswick, New Jersey, has taken over his duties with the city of White Plains as Traffic Engineer.

Present at the Asphalt Conference

Director Roy W. Crum of the Highway Research Board and an Affiliate Member of the Institute of Traffic Engineers gave an address on "The Relation of Asphalt Construction to that of Highways" before a gathering of over eight hundred at Dallas, for the Asphalt Conference held December 9-13.

Water Hypodermic Anesthetizes Parking Meters

Sudbury, December 11, 1940 — "Armed robbery" of Sudbury's new parking meters with water pistols is a new worry for police. Examination of parking meters, which indicate unexpired time long after the time limit was up, showed someone had squirted water into the meters after the money had been deposited. This caused the mechanism to freeze and stop."

—From the Toronto *Daily Star*, *December 11, 1940*

Conventions

To appear before the *38th Annual Convention of the American Road Builders Association* in New York City, January 27-31, 1941, are many members of the I.T.E. Among those presenting papers are Wilbur S. Smith, South Carolina Traffic Engineer, on "How to Use Traffic Analysis Data"; Theodore M. Matson, Bureau for Street Traffic Research, Yale University on "Illumination of Street Intersection Redesign." Dr. Miller McClintock and Maxwell Halsey, Director and Associate Director, respectively, of the Yale University, Bureau for Street Traffic Research, will be speakers at the new Highway Economics Division of the Convention.

The *Third Annual Southern Safety Conference* will be held in Birmingham, Alabama, February 20-21, 1941, with headquarters at the Tutwiler Hotel. An elaborate program has been planned and invitations are being sent out to every one in the nation interested in the various phases of Public Safety.

Fort Traffic Engineer Seen as Needed

The need for an expert traffic engineer to plan Fort Jackson's (Columbia, S. C.) traffic routing was stressed yesterday by Col. Lewis A. Page, post provost marshal, who said that approximately 11,000 automobiles, trucks and motorcycles are expected to be in operation at the post by next spring.

Colonel Page said that need for such a traffic engineer would exist when the military personnel is increased in the spring. (The present strength of the post is now around 23,000 officers and men, and this is expected to be increased by next July to around 45,000.)

As large as the problem at present is, he added, the South Carolina state highway department has rendered much valuable assistance in helping to solve it.

At present there are on the post 975 officers' automobiles and 850 automobiles registered to enlisted men. The number of officers' cars is expected to be increased by 200 in the next 30 days, and the number of enlisted men's automobiles is expected to be greatly increased by early spring.

In addition, 232 civilian employes on the post have registered their automobiles with the provost marshal as required, and approximately 3,000 automobiles and trucks from Columbia are operating on the post with the necessary permits.

Together with 5,000 government vehicles that will be concentrated at the post, Colonel Page said, a total of approximately 11,000 vehicles are expected to be in operation there.

New Applications for Membership

The following applications for membership in the INSTITUTE OF TRAFFIC ENGINEERS have been received:

Vurnen Leroy Johnson
Residing at: 1285 W. 114th St., Cleveland, Ohio
Business Address: Central Police Station, Cleveland

Bryan Wilson
Residing at: 734 No. Osage St., Girard, Kansas
Business Address: State Highway Commission of Kansas State Safety Division, Topeka

Fred J. Myers, Assistant Traffic Engineer
Business Address: State Highway Commission, Salem, Oregon

Executive Officers' Training School

Northwestern University Traffic Institute announces the Third Annual Executive Officers' Training School to be conducted February 3-14, 1941. This course deals exclusively with the administrative phases of traffic control and accident prevention and is open only to commanding officers in selected state and municipal departments.

Rutgers Announces Courses in Traffic Control

Rutgers University announces five courses in Traffic Control to be given beginning January 27. There will be a 20-week course in Traffic Control meeting in Clifton, New Jersey, for police officials of the state; two 20-week courses offered in New Brunswick and at Newark in Traffic Safety and Driver Education for the secondary school teachers of the state; a 10-week course in Police Administration for the ranking officers of police departments; and a 10-week course in the Administration and Techniques of Traffic Engineering for federal, state, county, and municipal engineers who have had previous traffic engineering courses offered by the University. Both of these courses will be offered in New Brunswick.

Reports and Publications

The Economics of Transportation in America—The education of a traffic engineer is not complete unless he knows all about his division of the transport system and its relation to other elements. Any traffic engineer should be interested, then, in a very interesting and excellent book "The Economics of Transportation in America," by Kent T. Healey, Assistant Professor of Economics, Yale University (Ronald Press, $4.00). This quite complete and excellent work starts with a historical introduction which begins with early highways and canals, runs through the steamboat and railroad period and generally brings the overall picture of transportation up to the present time. Following this introduction, the book covers: Part I. The Demands for Transportation in Econ-

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omic Society; Part II. The Building of the Nation's Transportation Facilities; Part III. The Functioning of Transportation Facilities, and Part IV. The Economic Regulation of Transportation by Government.

Well illustrated, excellently written and comprehensive as to scope, this book should be in the library of any traffic engineer who takes his profession seriously.

Practical Lessons in Traffic Safety—This booklet was compiled by Captain Frank T. Corcoran, Highway Patrol, Department of Highways of the State of Minnesota. W. F. Rosenwald (Mem. I.T.E.), who is Traffic Engineer of the Minnesota Department of Highways, states that this booklet which is published with the cooperation of the Department of Education of Minnesota is for school use in advancing safe motorist and pedestrian practices and is intended as an aid to the teacher for Safety Education. The booklet is illustrated with many fine photographs and should prove of great benefit to those whom it reaches.

Report of the Regulations on Neon Signs—The City of New York. This report was prepared by Charles C. Weinstein, representing the Committee on Traffic and Streets of the City Club of New York, New York. It has to do with the laws in New York City, governing the location, size, color, manner of use of illuminated signs. Enclosed are recommendations for the better regulation of neon signs.

Manual for Official Inspection Stations in the State of Pennsylvania—This booklet issued by the Bureau of Highway Safety, Department of Revenue of the Commonwealth of Pennsylvania, was compiled by T. E. Transeau, (Mem. I. T. E.). The manual includes in detail the rules and regulations governing correction, adjustment, repair, and inspection of motor vehicles. It is interesting to note that in Pennsylvania inspection stations are State supervised, the work being done jointly by the State Police and the Bureau of State Highway Safety.

Truck and Bus Drivers' Rule Book—Prepared by the National Conservation Bureau, New York City. This booklet incorporates a digest of those sections of the Interstate Commerce Commissions, Motor Carrier Safety Regulations (revised) which directly concern the driver. The National Conservation Bureau, in issuing this rule book, seeks to provide a convenient pocket size digest of those portions of the Insterstate Commerce Commission Safety Regulations which directly concern the driver. The regulations are presented in a brief form and in an easily understood language.

Annual Report, Department of Streets and Sewers, St. Louis, Mo.—This 63 page report is profusely illustrated with charts and photographs which show to the taxpayer of St. Louis where his money goes regarding expenditures on street and traffic matters.

Report on Street and Off-Street Parking for Los Angeles, Calif.—This report, presented by H. E. Smith, City Planning Director of Los Angeles, is in mimeographed form and deals with those surveys and studies which are under way in that city at the present time. The report also gives details regarding curb parking limitations, parking meters, and a survey of various other parking plans as effected in other cities.

1940 *Bibliography of Traffic Safety Materials and Publications.* A 34 page booklet compiled by the Department of Public Relations of the General Motors Corporation. It has been prepared to serve as a general guide in locating those publications and materials pertaining to some of the more popular subjects of traffic and highway safety.

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Look

Board of Direction Meeting

The regular winter meeting of the Board of Direction was held in Washington, D. C., December 4, 1940, attended by the six members of the Board of Direction.

The Board considered numerous matters affecting the conduct of Institute affairs of which the following will be of special interest to the members:

Traffic Engineering

The Board authorized Bernard Hartung, Circulation Manager, to prepare and distribute three thousand copies of a mailing piece, with return card attached, soliciting subscriptions to the Institute's monthly publication.

Proceedings

A special sale of back issues of Proceedings at reduced prices was authorized.

Free Publication of Annual Meeting Papers

The Board approved the publication of convention papers in technical magazines, prior to their publication in Proceedings, with the author's permission and provided that credit is given to the Institute and no reprints are sold.

Financing Expanded Program

Reports were received and approved with respect to the activities of the Policy Subcommittee on Financing which is actively working to develop and finance the enlarged program of Institute activities.

Committee on Cooperative Engineering Research

The appointment of a new committee of this title, under the chairmanship of Mr. Wilbur Smith, to develop and recommend cooperative projects with national engineering organizations in the traffic field was announced.

Many such potential projects were discussed and authorization was given to the committee to make certain definite proposals to other national organizations which will be announced in more detail later.

Nominating Committee

In accordance with Article V, Section 2 of the Bylaws, the Board appointed the following Nominating Committee:

Walter F. Rosenwald, Chairman
Walter H. Klapproth
William B. Powell
Ray F. Riegelmeier
I. S. Shattuck

Traffic Signal Head Standards and Specifications

The Board authorized the publication of this Standard in Proceedings, with reprints for individual sale. The Board also approved republishing the Standard as a part of the TRAFFIC ENGINEERING HANDBOOK.

Professional Openings

The Board authorized a recanvass of members of the Institute to learn the names of members actively interested in consulting jobs, and those who would be open for consideration of full time positions.

Greater New York Safety Conference

The Board authorized the Institute to participate, as one of the sponsoring organizations, in the Greater New York Safety Conference to be held in the Spring of 1941. Mr. Merwyn A. Kraft was appointed to represent the Institute on the General Committee and to develop the program for the joint traffic engineering sessions.

National Technical Roster

The Board accepted an invitation from the National Technical Roster to prepare the traffic engineering section of a proposed check list on transportation and traffic engineering and

authorized the Roster to distribute the questionnaires and check lists to all members of the Institute.

The National Technical Roster is designed to make available to the Federal government a comprehensive list of highly specialized individuals in all fields whose services might be required, either on a full time or consulting basis, by some agency of the Federal government.

G. E. Engineer Suggests Indirect Lighting for Tunnels

A new method of indirect tunnel lighting which would conceal the light from the motorist's vision while improving overall visibility and affording a saving in tunnel construction and maintenance costs, is suggested by R. M. Swetland of General Electric's Illuminating Engineering Laboratory at Schenectady, N. Y. He discussed the system at a joint meeting of the New York Sections of the American Institute of Electrical Engineers and the Illuminating Engineering Society at New York, December 12.

"The new system would use economical light sources mounted on attractive standards intermittently spaced along the tunnel servicing walk," he explained. "A special reflector design would direct the light away from the motorist's vision and toward the ceiling where it would be reflected uniformly to all parts of the tunnel. Such an indirect lighting system could be easily installed and maintained," Mr. Swetland said. He illustrated the features of the new system with a lantern slide of a model tunnel, built to scale, and illuminated by the indirect method.

TRAFFIC COUNTING SIMPLIFIED WITH
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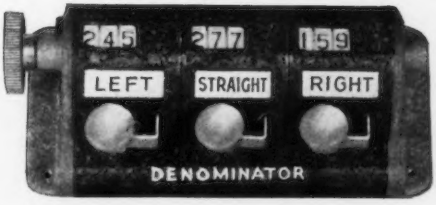

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Commenting on light sources, the General Electric engineer explained that the annual maintenance cost of sodium lighting systems for tunnels ranges as much as 50 per cent below that of other modern systems providing a comparable level of illumination.

Stressing the importance of providing adequate supplementary daytime tunnel entrance lighting, Mr. Swetland explained that this was necessary to eliminate the sudden and hazardous loss of visibility to motorists entering tunnels from bright daylight conditions. Whereas lighting levels of from three to four footcandles are now considered good practice for interior lighting of the average tunnel, carefully conducted tests indicate that intensities of 150 footcandles immediately inside the tunnel portals are desirable to successfully combat conditions of maximum sunlight outside, the engineer said. This supplementary illumination should be graduated down to the continuous tunnel lighting level, over an entrance section of from 300 to 500 feet in from the portal. A photoelectric control of two levels of such tunnel entrance intensity was advocated by Mr. Swetland to meet effectively both dull and bright daylight conditions.

Small City Builds $90,000 Automobile Parking Garage

Welch, W. Va., is erecting above its city-owned parking lot a two-floor $90,000 parking garage for automobiles of miners who come to town from the coal fields on paydays and Saturday nights, the International City Managers' Association said today.

Many cities own municipal parking lots, most of them, like Welch, utilizing city-owned land for this purpose. However, most cities spend little on the lots, with the exception of from $50 to $200 a year for maintenance, and ordinarily no attendants are supplied, the association said.

The Welch lot, bought by the city in 1936 at a cost of $20,000, provides space for only 80 cars and, except for a small off-street parking space operated by the chamber of commerce, is the only parking area within more than a mile of the business district.

Officials of the town, which has a population of 6,116, say the $90,000 for the new garage will be raised by issuing serial bonds at 2¼ per cent interest. When the building is finished, the city probably will charge two cents an hour for parking, with a minimum charge of 10 cents which, it is estimated, will pay operating and interest costs. Annual payments on the principal will be paid from receipts of a gross sales tax which local merchants have approved.

The city has been charging 10 cents a day and 25 cents overnight for use of the parking lot. Revenues have been sufficient to pay operating expenses and to retire original bonds at the rate of $1,000 a year plus interest charges at five per cent—a total of about $4,000 a year.

Among the unusual parking areas operated by municipalities are those of Kalamazoo, Mich., Detroit and Philadelphia, and Rockville Center, N. Y.

Kalamazoo operates a parking lot "for shoppers only" in the heart of the city's business district. The area accommodates 400 or more cars, is paved and lighted, and equipped with attendant's office, drinking fountain and comfort station. There is no charge for the first two hours parking, but 10 cents is charged for the third hour and five cents per hour thereafter. Parking is free between the hours of 6 p. m. and 8 a. m. Purchase and construction costs will be paid eventually through special assessments on business property.

Suburban motorists in Detroit park

on municipally-owned lots, and in Philadelphia on municipally-owned but privately-operated lots, near the business districts. In return for the parking fee they are given round-trip tickets to their offices on city transit lines. Car owners are charged 15 cents a day for parking in Detroit and 25 cents in Philadelphia.

Upon payment of $1, motorists of Rockville Center receive a metal tag from the city which allows them four hours parking, every day in the year, in the municipal parking lots.

Listen

Street Lighting Evaluator

The General Electric Street Lighting Evaluator is a field instrument designed by Messrs. Reid and Chanon with the collaboration of G. B. Buck, Jr., to provide the means for ready measurement of pavement and obstacle brightness and the veiling effect of glare at any point on the street or highway. By means of a chart based upon the above mentioned data, these factors are quickly converted into net visibility.

The device includes two photometers of a special design suitable for mounting on the hood and above the windshield of an automobile, and a control panel to be placed on the front seat of the car beside the driver-observer.

The photometer which determines obstacle and pavement brightness is in the form of a miniature street. A representative selection of pavement samples is supplied to simulate various bricks, concretes and asphalts. The obstacle is a miniature pedestrian with appropriate reflectance. The second photometer contains a "transparent diffuser" with the property of integrating the glare of all sources in the field ahead in proportion to their veiling or interference effect. The control panel houses the control, calibrating and recording equipment.

Use of this instrument makes possible the mapping of visibility values at significant locations along a street as well as determining the average and minimum values. Correlation of visibility values with night accident experience permits civic and safety engineers to proceed on a selective program of traffic safety lighting.

Looking Ahead

February 19-21, Ann Arbor, Mich.: Twenty-seventh Annual Highway Conference. Traffic sessions, February 19th.

Feburary 20-21, Birmingham, Ala.: Southern Safety Conference. E. J. McCrossin, chief, Division of Safety and Inspection, Alabama Department of Industrial Relations, Birmingham, Ala.

Mar. 6, Beaumont, Texas: Southwestern Industrial Traffic League, Edison Hotel, Beaumont, Texas. F. A. Leffingwell, Secretary, 1908 Santa Fe Bldg., Dallas, Texas.

Mar. 11-12, Philadelphia, Penna.: Seventh Annual Philadelphia Regional Safety Conference. (Bellevue Stratford Hotel.) Walter W. Matthews, manager, Philadelphia Safety Council, Chamber of Commerce, 12th and Walnut Streets, Philadelphia, Penna.

Mar. 31-Apr. 1, Boston, Mass.: 20th Annual Mass. Safety Conference. Lewis E. MacBrayne, general manager, Massachusetts Safety Council, 80 Federal Street, Boston, Mass.

Apr. 1-3, Pittsburgh, Penna.: Western Penna. Safety Council, 17th Annual Regional Safety Engineering Conference. E. J. Kreh, secretary, 704 Empire Bldg., Pittsburgh, Penna.

Apr. 2-3, Newark, N. J.: Seventeenth Annual Eastern Safety Conference. Fred M. Rossland, secretary-manager, Newark Safety Council, 24 Branford Place, Newark, N. J.

Apr. 15-17, Columbus, Ohio: All Ohio Safety Congress (Neil House). Thomas P. Kearns, superintendent, Division of Safety and Hygiene, Industrial Commission of Ohio, Columbus.

Apr. 22-25, New York City: Greater New York Safety Council, Twelfth Annual Convention and Exhibition. (Hotel Pennsylvania.) Greater New York Safety Council, Inc., 60 East 42nd Street, New York, N. Y.

May 1, Watertown, Wis.: 14th Annual Rock River Valley Safety Conference. B. C. Trueblood, director, Watertown Vocational School, Watertown, Wis.

May 6-8, Chicago, Ill.: Midwest Safety Conference. (Hotel Sherman.) Geo. G. Traver, manager, Greater Chicago Safety Council, 222 North Bank Drive, Chicago, Ill.

May 13 or 15, Eau Claire, Wis.: 6th Annual Upper Mississippi Valley Safety Conference. Harley M. Brook, director, Eau Claire Vocational School, Eau Claire, Wis.

May 22-24, Norfolk, Va.: Seventh Annual Va. State-wide Safety Conference. (Monticello Hotel.) Wm. M. Meyers, executive secretary, Richmond Bldg., Richmond, Va.

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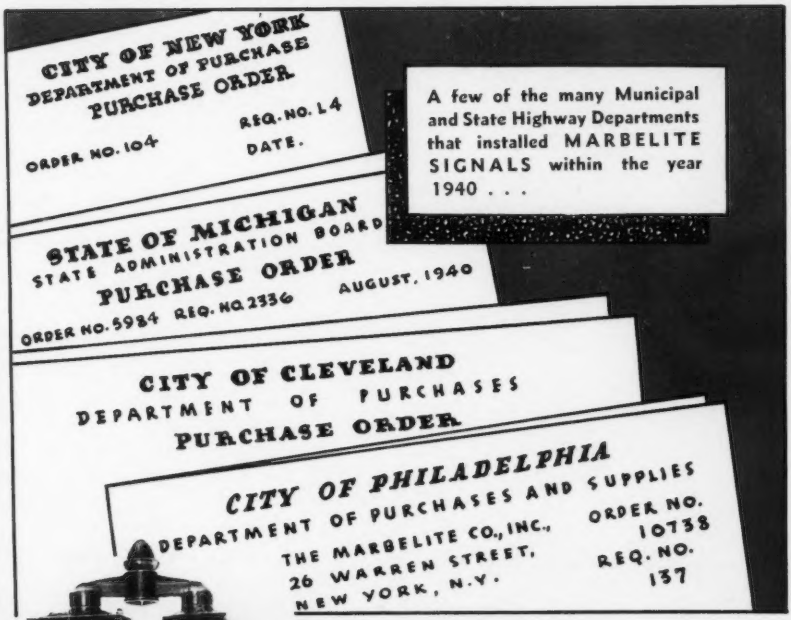
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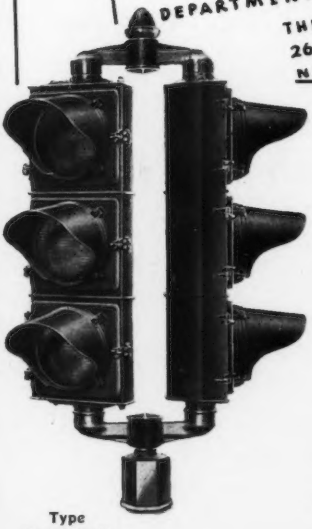

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Frankly Speaking

"After the Whistle Blows"

ON January 7, Mr. Hawley Simpson, President of the Institute of Traffic Engineers received a letter from the Honorable Frances Perkins, Secretary of Labor of the United States. This letter stated that "an unusually large number of reports have recently come to my attention about workers who have been killed or seriously injured in motor vehicle accidents. Many of these workers have been engaged in Defense production and in a number of instances, the accident has taken place while the workers either as a motorist or as a pedestrian has been going to or from work."

Madam Perkins in her letter calls upon every member of the Institute of Traffic Engineers to cooperate in every way possible with the handling of the new traffic situation being imposed upon local communities through the rapid expansion of Defense industries and large construction projects.

This letter is a timely warning, and one that the members of the Institute can well afford to take notice of, for the accidents to which she refers are those that are common as off-the-job accidents, and are accidents occurring to employees of industrial and commercial establishments who are not at the time engaged in the regular course of their employment. Sometime they are referred to as accidents "after the whistle blows."

I am sure that the Institute of Traffic Engineers is aware of the necessity for maintaining efficient traffic movement with the minimum of accidents as the tempo of industrial production, accelerated by Defense needs, increases. Also, I am sure that the entire membership will readily agree that it is just as important to protect our skilled and trained Defense workers "after the whistle blows" as it is for industry to have control of the on-the-job accidents!

The emergency defense program does not call for new agencies or new workers, but rather an expansion of existing programs and centers. Every industrial worker today is needed for production. Everything that you can do to protect the worker from the street and highway accident will aid in speeding up the Defense program.

As the Traffic Engineer in your community, county, or state, there is nothing more important that you can contribute to the welfare of your nation than to care for the safety of those workers who are so vital to our nation's security.

It is with this type of cooperation from the Institute of Traffic Engineers that those in our Defense industries can go and come safely "after the whistle blows."

Laurence B. Tipton

Editor, Traffic Engineering

NATIONAL DEFENSE AND THE ROAD SYSTEM

DEFENSE highways have been divided roughly into four classifications: (1) urban and rural sections of the strategic network, (2) urban and rural access roads to army and navy reservations, rail terminals, airports and industrial plants, (3) reservation roads, and (4) tactical roads.

To plan for the construction and reconstruction of these highways to military standards will require the utmost care that first needs be met first, that finances be adequate, that costs be fairly distributed, and that as many highways as possible built to meet military needs can likewise be useful to peacetime traffic.

A few months ago it was thought that the improvement of the strategic network, its 75,000 miles, with minor exceptions, coinciding with the most important traffic routes of the nation, would be a matter of first concern. But now, according to Thos. H. MacDonald, U. S. commissioner of public roads, the situation is "quite reversed." It has become apparent that access roads, and not the strategic network, must be given first consideration.

Mr. MacDonald explains: "A vast program of essential equipment, ordnance and military supplies is under way, necessitating many new plants and the enlargement and transformation for new uses of many old ones. The partial estimates now available indicate that the army and navy alone have need for 2,900 miles of access and reservation roads, which, if adequately improved, will cost around $200,000,000. The job of planning these access roads is under way, and in many cases the actual construction with the regularly available federal and state funds is going forward."

It is obvious that the problem of access roads is immediate and acute. The need for reservation roads is even more immediate, but total costs will probably not be so large. The planner's attitude toward the strategic network and tactical roads, however, will depend on what he conceives the defense problem of the United States to be.

If he believes that the country is in immediate danger of invasion, he must urgently favor devoting all spare effort to improving tactical roads in the areas where he conceives military invasion most likely to occur. Secondly, he is impressed with the need to bring all important highways entering the tactical areas into a high state of improvement. Third, he wants to devote the remaining effort to improving the strategic system.

On the other hand, if he believes that the United States is safe from invasion, but that war seems likely, he believes in the need for improving vital highways near the seacoast where embarkation of troops and freight movements to ships could be facilitated. These roads would be near the Atlantic if he saw the need to move ships across the ocean. They might be on the Gulf, the Pacific or the Atlantic if he saw South America as the scene of warfare. They would be on the Pacific if he saw a Pacific war.

If, lastly, he saw the necessity of continuing the national defense effort as a primary means of protection, even though he discounted the chances of war, he would be for improving the strategic network so that it might be most valuable to continuing commercial uses, and so that it would also be available to the army if war should come.

A random sample of the defense-highway needs of 17 state highway departments indicates at least three

general classes of problems worrying state officials in the planning of these roads. They are (1) the proportion of costs to be borne by the states, (2) total costs of the needed improvements, and (3) the rate at which they are to be constructed.

In considering proportionate costs, the officials make a distinction between construction primarily of commercial importance. C. W. Brown, chief engineer of the Missouri State Highway Department, observes that "development to higher standards than are demanded by peacetime activities is a bill that should definitely be charged to the cost of defense rather than to ordinary road-user funds."

In this, a number of highway officials concur, including Wilson T. Ballard, chief engineer of the Maryland State Roads Commission; W. Vance Baise, state highway engineer of North Carolina; C. H. Purcell, state highway engineer of California, and the Texas Highway Commission. New York's Superintendent Brandt believes that the failure of the federal government to provide special highway appropriations "seems inconsistent with the immense national effort being made to arm ourselves for defense."

The final report of the Public Roads Administration on the strategic network had not been made public as this article was written, but estimates on the cost of bringing defense roads up to required military standards totaled $600,000,000 for only 11 states.

Three agencies of the federal government have the power to designate defense highways — the secretary of war, the secretary of the navy and the government's defense advisory commission. Most highways, of course, are designated by the secretary of war or his department.

Formerly the War Department designated individual access and reservation roads based on reports of the PRA preliminary field investigations. It is now impossible to make these specific designations with sufficient promptness; and often, because of subsequent changes and enlargements, the preliminary highway-improvement plan does not now correspond with present plans for posts and reservations. The new procedure consists of a general designation by the War Department of posts considered to be of prior importance in each corps area, and places the responsibility of selecting the roads upon the Public Roads Administration and the WPA.

District engineers of the PRA and state administrators of the WPA are informed immediately, and corps-area commanders arrange conferences at each post among the representatives of all agencies concerned in proposed highway improvements, including representatives of the PRA, the WPA, the state highway department, local highway departments if local roads or streets are involved, the corps area, and the military post or posts concerned.

A memorandum of the Public Roads Administration states that "so far as possible, substantial agreement should be reached at the conference upon the essential improvements and their construction priority, and the method by which construction of each project is to be financed." It is recognized that cases may arise where the financing of immediate construction cannot be arranged at the conference, and such cases are to be reported promptly, and also the arrangements to undertake construction immediately.

Among the points to be agreed on in programming access roads are (1) responsibility for surveys, plans and engineering, (2) dates on which surveys should be undertaken, (3) what agency will supervise construction,

(4) standards of the improvement, and (5) allocation of engineering costs if federal-aid funds are involved.

The procedure for strategic-network projects is somewhat different. Studies of the network are "reasonably complete." The War Department, however, is not prepared to certify priorities except in the general classifications of first, second and third relative importance. Certification of particular improvements will be made by the War Department as traffic in connection with defense activities develops on the strategic routes, and as plans for military movements mature.

In the meantime it is expected that current federal-aid programs will include as much work as possible on the strategic network. Emphasis will be placed on the correction of obvious weaknesses, such as substandard bridges at critical locations, and improvements obviously of considerable military and civil value.

The WPA likewise has instructed its state administrators to give priority to defense-highway projects, and to expedite construction in every possible way, "acting in close cooperation with the PRA and the state highway departments."

Planning-survey information is expected to be invaluable in planning defense highways. "Had we been faced with the formulation of a highway program for national defense only 2 or 3 years ago, the necessary basic information was then seriously lacking," Commissioner MacDonald has said. "Now the way is clear. The state-wide planning surveys form a secure foundation for sound policies, and provide the detailed information for effective and immediate action."

It is clear that a logical program to meet defense-highway requirements is developing. So far as possible, emphasis is to be placed on constructing roads that will be of enhanced commercial importance. Routine procedures have been established in the direction of decentralizing control. "There is no thought," says Commissioner MacDonald, "of attempting to dictate programs or sequences of undertakings in any state."

Condensed from the original article in BETTER ROADS," January, 1941.

"SLOW, SPEED CONTROL SIGNAL AHEAD"

By CHARLES ADLER, JR.

THE State Roads Commission of Maryland has successfully reduced accidents at eight intersections on the Baltimore-Washington Boulevard by installing signals to control the speed of vehicles approaching the crossings.

Before these signals were installed, motorists and pedestrians alike, who were about to cross or turn into the boulevard from a cross-road, had considerable difficulty in doing so safely. The danger of being struck by the swiftly moving cars and trucks on the main artery was always present and these vehicles in many cases were moving at too great a velocity to be stopped by their drivers in time to avert a crash. Making a left turn from the main highway into a cross-road was also a hazardous undertaking, as cars approaching on the main highway from the opposite direction were moving too fast to be stopped in time to avoid colliding with the car making the left hand turn.

The problem of accident prevention at intersections on high speed roads could not be solved by the installation of the usual type of vehicle-actuated traffic signal, which displays a green

light to the main road for indefinite periods, changing to amber and then to red when traffic approaches on the intersecting road. Such a signal, while highly efficient in low speed territories, cannot be obeyed in many cases when installed on highways and boulevards where traffic moves at high speed.

In some cases, where this type of signal has been used in high speed territory the green light is visible for considerable distances, and experience has shown that motorists approaching the intersection on the main road, upon viewing the green indication, fail to reduce the speed of their cars and, in fact, frequently increase their speed in an effort to reach and pass the signal before it changes to amber and red. When the signal does change, motorists are going too fast to be able to stop without over-running the crossing. They sometimes collide with cars coming out of the cross-road and cause bad accidents.

Drivers on the main road also, attempting to make a left turn into the cross-road on the green light are sometimes struck by cars approaching from the opposite direction on the same road. Tempted by the green light, the driver of the car from the opposite direction is going faster than the driver of the turning car realizes, and a collision occurs.

On the Baltimore-Washington Boulevard the Speed Control Signals are marked by advance reflectorized signs bearing the legend "Slow, Speed Control Signal Ahead". The signals cause the drivers of all cars approaching the crossings to decelerate to a rate of speed whereby the vehicle is under complete control of the driver and can be stopped promptly should conditions demand it. The signal also directs the right of way of automobiles at the intersection in exact accordance with traffic demands, thereby combining the efficiency of a full vehicle-actuated intersectional system with the safety of speed control. Traffic is passed thru the intersections with utmost dispatch, but at a safe speed. No vehicle is stopped unless, either it is going too fast, or cross-road traffic is about to move.

The four faces of the Speed Control Intersectional Signal normally show the red light to all approaches of the crossing. Imbedded in the right-hand lanes of each road, 250 feet from the intersection, are vehicle detectors which are wired to the signal controlling mechanism housed at the side of the crossing.

When a car approaching the intersection on Washington Boulevard actuates the detector, the signal mechanism is set into operation, and, after a delay of several seconds, the signal is changed from red to green. The duration of this delay is equal to the number of seconds required for a vehicle to traverse the distance between the detector and the signal if the car is traveling at 30 miles an hour or less.

If the driver is cooperative, and voluntarily reduces speed upon passing the advance warning sign, the signal will change from red to green just before he reaches it and permit him to negotiate the crossing without stopping, assuming, of course, that no traffic is moving from the cross-road. If driving too fast, he will have to pause momentarily before the green light is displayed.

On the arrival of a car on Washington Boulevard, northbound, the northbound face only, changes from red to green after a time delay to provide the speed control feature. The green remains on for a brief interval and then returns to red in the absence of following cars. When southbound cars on Washington Boulevard arrive, the southbound signal face acts in a similar manner, but the northbound

and southbound signals facing Washington Boulevard are controlled by their respective cars independently of each other, so that the speed of cars approaching on the main highway is controlled separately from that of cars coming in the opposite direction.

On the cross-road, when vehicles actuate the detectors, the signal mechanism shifts from red to green and locks red both north and south signal faces on Washington Boulevard, if there is no traffic approaching on this road. If traffic is moving on the boulevard, and either or both of the north and south signal faces are green when cars approach on the cross-road, amber indications are displayed for a time period before right-of-way is transferred to the cross-road.

The duration of east and west green indications is governed by the number of automobiles negotiating the crossing on the intersecting road. However, if traffic is continuous, the signal will revert to amber and red and permit Washington Boulevard traffic to proceed after a maximum time period has elapsed.

Protection of pedestrians is provided for at a number of the intersections. Push-buttons are mounted on poles adjacent to the crossings, which when actuated, stop traffic on the main highway for a period of time sufficient to enable pedestrians to walk across the boulevard in safety.

An original article by Charles Adler, Jr. (Affil. I.T.E.), Baltimore, Md.

USE AND APPLICATION OF ENLARGED TRAFFIC SIGNS

By BERNARD C. HARTUNG

FOR the past few years we have all heard a good deal about the proposed "highways of tomorrow" and what could be expected when this magnificent network of super roads and limited ways became a reality. The writer is in agreement that each class of roadway from the heavily travelled, high velocity thoroughfare to the little used feeder road must eventually be scientifically planned, adequately improved and properly correlated; all of this to the end that there might result a more unified, safe and improved highway system. The very apparent obstacles which stand in the way of the above development are money and time and until these two elements provide us, barring social and economical reversals, with such a utopia of traffic channels, it will be necessary to meet the present needs in the best manner possible.

It is readily agreed that it is an economic impossibility to reconstruct our present system of highways to keep pace with the rapid improvement being made in the modern vehicle. In this paper, it is submitted that the use of enlarged traffic signs, warning, guide or directional is *one* very definite method of combatting certain mal-adjustments which are constantly occurring in this transition period. Two principal elements will be considered, namely, *Visibility* and *Speed*, and it is upon those factors that proof of the value of the large signs will be established.

Before proceeding into the details associated with the application and use of enlarged signs, it might be well to review the experimentation that has taken place in some of the states. About two months ago, the State of Michigan adopted a program calling for the use of larger STOP signs and route markers and the abandonment of excessive pavement markings. In their initial experimentation the Mich-

igan officials utilized 36" x 36" stop signs and 48" x 48" advance warning signs, and as a result, discovered that the percentage of disobedience decreased 50% during daylight observation and 75% in the after dark hours. With directional markers it was found that the response was even more encouraging. In other words, the large overhead signs and route markers are helping to "clean up" the adverse condition existent at certain important junctions.

Massachusetts has for a number of years used the large panel signs, i.e., 48" x 48" cross road or junction markers. The writer has no information as to actual results achieved from these enlarged signs but from personal observation would state that they were proving themselves very effective. The outstanding feature of this marker is the use of an off-color panel on which is contained the legend or copy. This white panel (yellow background and black letters) aids visibility and facilitates replacement and repair.

Down in Dallas, Texas, the city officials have adopted super-size signs suspended over their main streets, these at the entrance to the city. No one can possibly become confused upon entering the city because these main arteries are so clearly labelled.

Connecticut, Indiana, Ohio and South Carolina have all carried on experiments with the oversize signs and their unanimous opinion is that this type of marker has a very definite place in highway treatment. This position is based on the fact that observance of such signs has improved with the aforementioned enlargement. In the State of Nevada, we have treated, during the past three months, a number of our intersections with these big markers. One interesting point is that a combination of white on black rather than the black letters on a white background is found more suitable for our use. This is readily understood when it is pointed out that the predominant background or countryside in Nevada, as in many other western areas, is a light gray or brown in color. Thus a much more noticeable contrast can be achieved with the darker sign.

Mention was made earlier of the two elements — *Visibility* and *Speed*. From the standpoints of the former, permit the writer to quote from Dr. Luckiesh, Director of the Lighting Research Laboratory, General Electric Company, "Size of an object or of a critical detail is the most generally noticed in visibility." Applying further conditions to actual experience found on the highways, we find this authority explaining "From the viewpoint of seeing, size is not merely the visual dimensions of an object as measured with calipers, visual size involves *distance* as well. Thus, this visual size of any dimensions or detail is only one-tenth as large at a distance of one hundred feet as at ten feet." How obvious this factor stands out when the driver of the car is proceeding down the road at sixty miles per hour and attempts to "pick out" the message on the signs that flash by him.

Quoting one of the leading traffic engineers in the country, we find the following reaction "The use of super signs should be reserved for locations that have demonstrated themselves, due to their accident ratio, to be hazardous spots. Also, the big markers should be utilized at points where standard signs have been found to be inadequate because of high speeds." This is precisely the conditions under which the writer feels that the super treatment should be recommended. In this manner, the large signs will not lose their ineffectiveness through promiscuity but rather will be an outstanding identification of these points or locations where the driver must give the maximum attention to the

existing terrain. From another angle, their prominence will assure attention and visibility as far as the attention of the driver is concerned.

Direction signs with copy too small to be read are a prolific source of uncertainty in the confusion of fast movement or dense traffic. Many officials, however, hesitate to use this large copy on directional signs because of the length of names and the amount of space required. Thus, the designation, Indianapolis, would require a backboard of considerable size. This problem is frequently simplified where the route numbers themselves can be emphasized and certainly there is a large proportion of the motoring public today who look towards such markers as their main travel guides. At one important junction near the outskirts of the City of Reno, oversized route markers in the form of the familiar shield have been installed with the result that there is considerable less confusion on the part of the tourists or out-of-state cars moving through that section. The development of signs with copy readable at greater distances than has been required in the past brings about several new considerations which hitherto have not been of maximum importance. Thus, with the use of reflectors, which normally reflect a light colored background in daylight, copy with a light colored stroke on a dark background is found to be superior. Such reflector agents contribute to the light copy but rob a dark colored letter of its daytime legibility. This together with the more favorable contrast, mentioned previously in this article, leads us to believe that the reverse color combination will consistently gain favor throughout the nation. One state in particular—Maryland—uses a white, or aluminum, on black combination exclusively.

Traffic officials throughout the country are continually faced with accidents and other forms of traffic ills at certain definite locations. Practically everyone of these men have attempted to alleviate this condition by adding more and more standard signs and in many cases have found themselves with a whole multitude of markers and not one of them carrying the necessary "punch." It is found that the driving public is seeking simplicity and yet on our modern highways this must be handed to them in large enough doses to assure a maximum number of "cures." Every man who has given careful study to his highway traffic problems has these sore spots clearly in mind and it does not take him long to realize that some sort of treatment, other than the multiple small sign installation, will be the answer.

An original article by Bernard C. Hartung (Jun. I.T.E.), Director, Safety & Traffic Division, Department of Highways, Nevada.

NIGHT DRIVING AND TRAFFIC SAFETY LIGHTING IN 1940

By DUDLEY M. DIGGS

A GROUP of traffic safety experts recently sat around a table in Chicago discussing night traffic hazards. In the course of their discussion it was pointed out that fatal night accidents in the United States had climbed 15 per cent from 1930 through 1939, while fatal day accidents had actually dropped 18 per cent. (Accurate figures are not available yet for 1940.) When figured on a hazard exposure basis, it was agreed that there are three times as many fatal traffic mishaps per mile of travel

at night as in the daylight.

Night traffic accidents in the 10-year period have killed over 196,000 people, or more than the population of San Diego, Calif.; or Tulsa, Oklahoma; or Jacksonville, Florida; or Grand Rapids, Michigan; or Bridgeport, Connecticut. The principal reason for the abnormal rate of night traffic deaths in this period was agreed by the traffic experts to be the most obvious difference between day and night driving—less visibility, and the failure of automobile drivers to compensate for it.

Operators of motor vehicles in 1940 used 40 per cent more gasoline in their travels than the automobile drivers of 1930, which indicates a big increase in traffic flow. Yet despite more traffic, street lighting protection for the country as a whole has decreased, with expenditures in 1940 about 17 per cent less than they were in 1930.

It becomes apparent that the majority of cities have not improved their lighting systems to offset increased hazard exposure. Street lighting equipments now operating in most cities were installed in, and designed for, a slower-speed era when automobiles were not the factor they have become today.

Outside city limits, where night visibility must be created mostly by automobile headlights, hazard exposure also has increased. Statistics show night accidents along rural highways increased 32 per cent from 1930 through 1939, while day accidents on these same highways increased only 2 per cent.

The trend in urban street lighting is definitely toward the provision of adequate night visibility for the night driver and pedestrian. Each year finds more cities and towns from coast to coast, and border to border, inaugurating modern traffic safety lighting, and others expanding their modernization programs. These cities are so far relatively few in number, but the success they are having in accident prevention is noticeably helping to lower the urban night accident rate of the nation. Records show that urban night accidents have been decreased 11 per cent since 1930, which can be compared with a rural night accident increase of 32 per cent. And where accurate and complete records are kept, cities introducing medium traffic safety lighting invariably show substantial reductions in their night accident rates.

In 1940, the outstanding traffic safety lighting installation was made along the 35 miles of the Belt Parkway, New York City's newest major traffic artery. It is the longest and largest system of its kind in the world, doubling in length the previous world's longest stretch of sodium lighting on Route 7 outside Schenectady, N. Y., and more than doubling the number of lights used on the San Francisco-Oakland Bay Bridge which once held the record for the most sodium safety lights in operation.

Among some of the cities starting street lighting modernizations, or continuing programs in 1940 were: Irvington, Camden, New Brunswick, and Atlantic City in New Jersey; Springfield, Lorain, and Toledo, Ohio; Binghamton, Rochester, Schenectady, and New York City in New York State; Alameda, San Diego, Los Angeles, Oakland, and San Francisco in California; Chattanooga and Memphis in Tennessee; Bridgeport, Hartford, and New Britain in Connecticut; Charleston, W. Va.; Concord, N. C.; Evansville and Gary, Indiana; Marshalltown and Iowa City, Iowa; Minneapolis, Minn.; Detroit, Mich.; Pawtucket, R. I.; Miami Beach, Fla.; Richmond, Ind.; Boulder City and Denver, Colo.

The New Jersey Highway Department continued its cooperative traffic safety lighting program whereby it

helps municipalities and counties to illuminate proved night danger zones where adequate lighting systems are needed. The Illinois Highway Department provided for sodium safety lighting at two main intersections on U. S. Route 66 north of Springfield, and laid plans for lighting two other intersections south of that city. The Washington Highway Commission completed the safety lighting of the world's longest floating bridge across Lake Washington at Seattle, also the illumination of an approach tunnel near the bridge. Sodium lights are used on the bridge and in the tunnel. Mercury lights supplement the sodium lighting in the tunnel during the daytime.

R. T. Dorsey (Mem. I.T.E.), traffic engineer of Los Angeles, Calif., in a report published in 1940, revealed that sodium safety lights at 25 important intersections had brought about substantial reductions in night accidents, injuries, and deaths over a two year period. Comparing the night accidents two years before and two years after the sodium lighting, Dorsey found night collisions cut 78 per cent, night injuries 79 per cent, and night fatalities 92 per cent.

An 88 per cent reduction in night accidents over a 15 month period at one intersection protected by sodium lights was reported by Melvin J. Bankhead (Mem. I.T.E.), traffic engineer of Los Angeles County, in a talk before the first annual Pacific Coast Conference of the Illuminating Engineering Society in April.

Reports on a State-financed stretch of sodium lighting on U. S. Route 20, southeast of Michigan City, Indiana, showed night accidents have been eliminated in the past three years with the aid of the safety luminaires. Five persons were killed, 16 persons injured, and heavy property damage resulted in night accidents during a three year period prior to the safety lighting.

Figures were made available in 1940 which show the value of modern traffic safety lighting on thoroughfares with abnormal night accident rates. Hartford, Conn., estimated a saving of $78,500 in the cost of night accidents on 10 miles of relighted streets over a two-year period. This was $61,700 over and above the added cost of the new lighting. This saving in property damages and losses through personal injuries does not take into account the value of lives saved. In two years before lighting improvement on the 10 miles of streets, 12 pedestrian fatalities occurred at night. In a similar period after the lighting improvement, only one night pedestrian fatality occurred.

Industrial and transportation facilities were called upon in 1940 to "speed up with safety" for the greatest manufacturing program the United States has ever planned. This program will soon demand an enlargement of and greater efficiency on the part of our distribution facilities. The strategic trunk highways of the nation will undoubtedly be called upon to carry more cars and trucks, possibly at higher speeds and under all weather conditions. Increased night use of trucking facilities to help deliver more raw materials and manufactured goods is bound to come.

At present our main trunk highways are pretty well crowded in the daytime, but only one-third of the total traffic flows at night. It is reasonable to believe that with adequate lighting systems on the main trunk routes, night traffic, and particularly trucking, could be increased and speeded up with safety. But based on past experience, a substantial increase in the volume of night traffic without the provision of proper safeguards would only send the totals of night

deaths and accidents skyrocketing to new highs.

Industrialists in 1940 were being advised by lighting engineers and safety experts to provide proper lighting for traffic routes through and adjacent to these plants. Such lighting will facilitate the flow of raw materials and finished goods during the dark hours, while protecting employees and helping to detect possible acts of sabotage.

An original article by Dudley M. Diggs, Lighting Division, General Electric Company.

AUTOMOBILE ACCIDENTS IN A RURAL AREA TRAVERSED BY A TRANSCONTINENTAL HIGHWAY

By JOHN H. POWERS, M.D.

Editor's Note: It is interesting to note that the American Medical Association has become so conscious of the accident problem that the major part of their November Journal was devoted to it!

AN automobile accident in the open country is far more likely to result in serious injury and death than is a collision on the congested highways of a metropolitan district. In New York State during the past three years 8,022 persons were killed and 298,846 were injured by motor vehicles. Greater New York, with 55 per cent of the population of the state, was credited with 60 per cent of the accidents but only 30 per cent of the fatalities. During these same three years rural New York, with 15 per cent of the population, was credited with 40 per cent of the fatal accidents.

The surgical staff of the Mary Imogene Bassett Hospital in Cooperstown, N. Y., is in a particularly favorable position for the study of automobile accidents in a rural area. The village is situated in the eastern central part of the state, 10 miles south of U. S. Route 20, a transcontinental highway from Boston and New York through Albany, Syracuse, Buffalo, Cleveland and Chicago to the West. The hospital serves an area 50 miles in length along this highway and most of the persons seriously injured on this section of Route 20 are referred there for treatment.

The survey embraced by this report is based on the analysis of 492 accidents from which 712 patients were received at the hospital during the years 1930-1939 inclusive. It includes all the accidents in which a motor vehicle participated in any way other than those which occurred in a public garage or on a farm.

ANALYSIS OF ACCIDENTS

Seasonal, Weekly and Daily Distribution. — The sharp increase in the number of accidents and particularly in the number of persons injured on the open road during the summer is striking. The peak occurs in August, which is without question the most dangerous month of the year in the country, both on the highway and on the farm. It is interesting that February and March, when the roads are in the worst possible condition, are the safest months for travel in rural areas.

The week end is extremely hazardous, particularly Sunday. Not only do most accidents occur on this day but more people are injured per accident. Monday and Thursday are comparatively safe.

It is apparent that the hours of late afternoon and early evening are the most dangerous. Traffic is heaviest during this portion of the day, drivers and pedestrians both are weary, and both are anxious to reach their

destinations; excessive speed by the former and undue carelessness by the latter are common. The hours between 5 and 8 o'clock in the morning are safest for travel on the open road; drivers are rested and traffic is light.

Sixty per cent of these 492 accidents occurred during the hours of daylight, 33 per cent at night, and 7 per cent during the dusk of early morning or late afternoon.

Location of Accidents—The location of sixty-four accidents in which seventy-seven patients were injured is unknown. Seventy-two per cent of the remaining accidents, in which 76.7 per cent of the patients were involved, occurred in the open country.

Thirty-six and one-tenth per cent of the accidents took place on straight roads, 20.7 per cent on curves, 12.9 per cent at intersections and 10.1 per cent on hills. Many of the fifty-four accidents which occurred in driveways, yards, parking spaces and private garages were due to passengers falling while entering or leaving cars or to drivers cranking or repairing their own machines.

Classification of Accidents.—Accidents in which the car was in motion but no collision occurred were most frequent. These were usually due to failure to make a turn by an operator who was driving too fast on a road with which he was unfamiliar. Collisions between motor vehicles, with fixed objects, and with pedestrians were next in order of frequency. These four types comprised 82.6 per cent of those accidents in which the data are known.

Types and Condition of Vehicles Involved.—Of 607 vehicles involved, 84.7 per cent were passenger cars; 82.2 per cent of the vehicles were apparently in good condition, a fact which strongly suggests that most of the accidents were due to carelessness of the driver; 3.4 per cent had defective tires, 2.8 per cent defective brakes, 2.4 per cent defective headlights and 1.9 per cent a defective steering mechanism.

Types of Collisions.—Head-on collisions and sideswipes were most common and comprised 73.5 per cent of the accidents. Angle and rear end collisions were less frequent. Two hundred and thirty patients were injured in 184 accidents in which no collision occurred.

Direction of Travel. — Eighty-two per cent of the patients were injured while traveling straight ahead. Surprisingly few mishaps occurred while turning in either direction or backing. The solution of the problem of automobile accidents on rural highways appears to rest largely with the operator who is driving forward.

Condition of Drivers, Roads and Weather.—Eighty-three per cent of the accidents happened while the vehicles were being operated by drivers who were apparently normal; 9.3 per cent were obviously intoxicated and 4.1 per cent were admittedly asleep.

Nearly 70 per cent of the accidents in which likewise 70 per cent of the patients were injured occurred in clear weather.

Two thirds of the accidents in which the data are known happened on dry roads. Wet pavement was a contributory factor in 20.2 per cent; ice and snow were responsible for only a small proportion.

Comment

From the preceding facts it is apparent that persons who wish to comply with every precaution for safety on the rural highway should confine their driving to any Thursday in February or March between the hours of 5 and 8 o'clock in the morning. If the road is crooked with many intersections, the surface snowy or icy and the weather foggy, one may venture

forth with a reasonable certainty of reaching one's destination. And, as a matter of fact, such is actually the case because under those conditions one will be forced to drive both slowly and carefully.

Analysis of Injuries

Distribution by Age and Sex.—In the rural section of central New York embraced by this study both sexes were injured in automobile accidents very much more often between the ages of 15 and 24 inclusive than during any other decade of life. Throughout all ages males were involved with twice the frequency of females.

Position of Patients When Injured.—Drivers and passengers in the front seat were injured with equal frequency, passengers in the rear seat less than half as often. Pedestrians and cyclists comprised only a small proportion of the patients.

Classification of Injuries.—The 712 patients injured in these 492 accidents received 2,891 recorded injuries, classified according to the second edition of the Standard Classified Nomenclature of Disease. Fractures comprised the most common group; there were 655, of which seventy-four were compound. Lacerations, contusions and abrasions were next in the order of frequency. One hundred and eighty-four of the patients sustained concussion of the brain and 104 patients were in shock when they arrived at the hospital, an incidence of 26 per cent for the former and 15 per cent for the latter.

Topographic Location of Injuries.—Actually of more interest in a study of the injuries received in automobile accidents is their topographic distribution. The head and neck appear to be the most susceptible and in this series were injured twice as frequently as any other portion of the body. Traumatic lesions of the shoulder and upper extremity, the trunk, and the hip and lower extremity were comparable to one another in numbers but less than half as common as injuries of the head and neck.

Period of Hospitalization.—As a result of these automobile accidents, 473 patients spent 9,850 days in the hospital, or a total period of 26.3 days. Eighty patients made only one visit to the accident ward and then went on their way. The average number of visits was four.

Fatalities.—Thirty-five accidents were fatal. Twelve persons were killed immediately or died at the scene of the accident before the ambulance arrived; two of these are known to have sustained multiple compound fractures of the skull and face. Seven patients were moribund on admission to the hospital and survived for an average period of only thirty-five minutes after arrival. With the exception of one patient who succumbed to a pulmonary emolus 237 days after his accident, the duration of life in the remaining fifteen fatal cases was approximately six days.

The chief causes of death among the twenty-three patients who reached the hospital were fractures of the skull (seven simple and five compound) twelve cases, intracranial hemorrhage without fracture two cases, fracture-dislocation of the spine (one cervical and one dorsal) two cases, crushing injury of chest with ruptures of multiple intrathoracic and intra-abdominal viscera one case, pulmonary embolism three cases and bronchopneumonia two cases.

The mortality rate for accidents on the open road was 8.5 per cent.

Conclusion

Excessive speed and lack of acquaintance with the hazards of the open road are responsible for most automobile accidents on rural highways.

Condensed from an article by Dr. John H. Powers of Cooperstown, N. Y. The Journal of the American Medical Association, Nov. 1940.

Stop, Look and Listen

Stop

Personal Items from Here and There

T. T. McCrosky (Assoc. I.T.E.) was the principal speaker at the City Planning Division of the American Society of Civil Engineers in New York, January 17. *Roy W. Crum* (Affil. I.T.E.) discussed Depreciation as it Applies to Highways at the same meeting.

Maxwell N. Halsey (Mem. I.T.E.), along with *Leslie Williams* (Jun. I.T.E.), *Bernard C. Hartung* (Jun. I.T.E.) and *Howard F. Ilgner* (Mem. I.T.E.) were speakers before the American Road Builders Association Convention in New York on subjects relating to the Necessity for Safer Intersections.

Bernard C. Hartung (Jun. I.T.E.) has been appointed Chairman of a Committee on Traffic Engineering and Safety of the Western Association of State Highway Officials and in such capacity is undertaking at the present time activities aimed directly at the establishment of a uniform traffic engineering procedure in the states represented by the Western Association

T. T. McCrosky (Assoc. I.T.E.) was honored at an all-engineering societies banquet at the Hotel Sherman, Chicago, February 10. Mr. McCrosky recently became Executive Director of the Chicago Plan Commission, resigning his post as Planning Director of the Department of City Planning, New York City, to go to Chicago. Several tables at the banquet were reserved for I.T.E. members.

An informal luncheon of twenty-seven Institute members was held at the Stevens Hotel, Chicago, on Friday, January 31, 1941. The occasion was the Annual Mississippi Valley Safety Conference in which the I.T.E. was prominently represented. Luncheon guests were E. M. Turner, newly appointed Traffic Engineer, Tennessee Highway Department, Nashville, Tennessee; and J. G. Porter, Engineer on street traffic matters, Illinois Commerce Commission, Chicago.

Congratulations!

On February 3, 1941, the Common Council of the City of Plainfield, New Jersey adopted a resolution which was approved by the Mayor creating a Traffic Engineering position in that city. Mr. Eugene A. Barton (Jun. I.T.E.) has been appointed to this position and will serve in the capacity of Traffic Engineer for Plainfield. However, since the position created is not a full time job, this will in no way affect his status as a member of the Traffic Division of the National Conservation Bureau.

Traffic Engineering Education

Rutgers University opened its Fourth Course, in Traffic Engineering on Thursday afternoon, February 6th, with an attendance of thirty engineers. This Course, dealing with the Administration and Techniques of Traffic Engineering, is open only to Federal, State, County and Municipal engineers, who have had traffic engineering experience or engineers who have successfully completed any one of the courses in Traffic Engineering offered by the Bureau of Public Safety in 1938, 1939, and 1940. Mr. Harold F. Hammond (Mem. I.T.E.), Director, Traffic Division of the National Conservation Bureau, is instructor of the class. The Course is for ten meetings of three hours each.

Polytechnic Institute of Brooklyn opened a Course on February 4, in Traffic Aspects of City Planning. This Course deals with the origin and development of urban communities, with particular emphasis on the increasing complexity of transportation problems as the city grows. The Course, meeting on Tuesday evenings, will run for the second half of the academic year, and will be given by Dr. B. D. Greenshields (Assoc. I.T.E.), Adjunct Professor of Engineering.

The Illinois Institute of Technology began a course on February 10th in Traffic Engineering. This course is open only to graduate students and advanced seniors. The Illinois Institute is a consolidation of the Armour Institute, where Traffic Engineering Courses have been held for several years. Professor S. M. Spears will conduct a series of lectures, field studies and laboratory work.

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Conferences

Nineteenth Annual Midwest Safety Conference. The General Sponsoring Committee for the Nineteenth Annual Midwest Safety Conference which is to be held at the Sherman Hotel, Chicago, on May 6, 7, 8, 1941, had its first meeting January 7th. An invitation was extended to the Institute of Traffic Engineers to act as a joint sponsor of this conference again next spring and to take charge of the public safety session programs as it has done in the past three years. The Board of Direction of the Institute of Traffic Engineers has put aside the time of 4:30 P.M., May 6th, for its meeting.

The Sixth Regional Conference on Highway Safety and Motor Vehicle Problems called by the New York Joint Legislative Committee on Interstate Cooperation and the Council of State Governments was held February 14-15 at 10:00 A.M. at the Hotel Roosevelt, New York City. Harold C. Ostertag, Chairman. Participating states were Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, and Delaware. President Hawley S. Simpson, of the Institute of Traffic Engineers, was invited to attend and to present any suggestions or material he cared to offer.

Reports and Publications

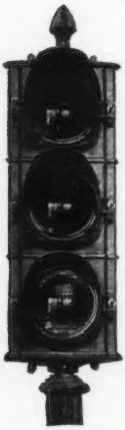
Report of Street Traffic in the City of New Brunswick, New Jersey. This survey was directed by Richard W. Siver, Traffic Engineer, White Plains, New York and the Technical Advisory Committee had among its members Lawrence B. Tipton, Vice-Chairman (Affil. I.T.E.), Harold Hammond (Mem. I.T.E.), and Arnold H. Vey (Mem. I.T.E.). This report is beautifully illustrated with a number of drawings and recommendations in complete form for a proposed traffic plan for the City of New Brunswick as it relates to all Municipal Departments. Of special note are the recommendations which appear in condensed form on page one of the report.

The 1940 Reports of the National Safety Council Committees on, Test for Intoxication, Pedestrian Control, and Protection and Prevention of Night Traffic Accidents. These three reports, running an average of thirty-three pages each, are nicely illustrated with charts and photographs to indicate the findings of these Committees. On page four of the "Committee on Test for Intoxication" are found twenty-five recommendations. On page five of the report for the "Prevention of Night Traffic Accidents" are found sixteen recommendations and on page five on the report of "Pedestrian Control and Protection" are found nine recommendations. These pamphlets have been prepared to give public officials and all other interested citizens a condensed summary of the findings of these Committees.

Sixteenth Annual Report of the Rhode Island State Police. This report, released by J. H. Harwood, Superintendent, Rhode Island State Police, is a comprehensive twenty-two page pamphlet dealing with the activities of this organization during the past year. Such subjects as "The Operations of Traffic," "The Number of Arrests," "The Number of Accidents Investigated," "The Number of Fatal Accidents," and "Hit and Run Accidents" are covered nicely.

Experience of Cities with Painted Traffic Lines. This bulletin has been compiled as a result of numerous inquiries to the American Public Works

ELECTRIC SIGNALS



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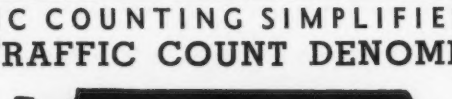

Other models with from 1 to 12 classified counting units mounted in horizontal line.

By simply pressing key one count is recorded in classified counting unit controlled by that key.

Touch method employed permitting operator to keep eyes on road at all times.

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Association concerning painted traffic lines. The bulletin includes information on the experience of cities with traffic paint including durability, frequency of repainting, and other pertinent factors. The bulletin is twenty-eight pages in length and has been mimeographed.

Proceedings of the Eighth Annual Meeting of the American Association of Motor Vehicle Administrators. These Proceedings are prepared by A. W. Bohlen, President of the American Association of Motor Vehicle Administrators and are conveniently compiled in a ninety-seven page printed booklet. The Proceedings include the Annual Meeting Report of the Administrators giving in printed form the contents of the various addresses presented then.

You Can Solve the Traffic Problem. A report by the Bureau of Highway Safety of which T. Elmer Transeau is Director (Mem. I.T.E.). This fifty-page mimeographed report is a review historically of the development in the Highway Safety problem. It has been compiled for the use of lecture purposes and is a fine source of information when needed. It outlines in complete form the development of the automobile, the street traffic problem, the police, the driver, the road, the pedestrian and education, engineering and enforcement.

Georgia Manual of Uniform Traffic Control Devices. This handsome leather bound 112 page offset report is released by M. C. Bishop, Director, Division of Traffic and Safety State Highway Board of Georgia. In publishing this manual, the State of Georgia is taking the first authorized step toward state-wide uniformity in traffic control devices. It is noticeable that this manual adheres to the stan-

dards already set up in the Manual of Uniform Traffic Control Devices for Streets and Highways. All designs, color work, printing, and assembling were done by employees of the Division of Traffic and Safety, of which Richard D. Dier is Assistant Traffic Engineer.

Recommended Practice of Street Lighting, 1940. Prepared by the Committee on Street and Highway Lighting of the Illuminating Engineering Society. This thirty-six page printed booklet includes a comprehensive study of street lighting from a technical viewpoint and should contribute and give a general knowledge of the data that are the traffic engineer's concern on this subject. Included in the book is data concerning the Visibility for Traffic Safety, the Lighting Fundamentals, etc. On page nineteen are found Lighting Recommendations that cover practically every desired point that an engineer might wish to know. The Institute of Traffic Engineers collaborated with the Committee in preparing certain sections of this report and on the Committee Membership will be noticed the following Institute Members: Kirk M. Reid (Affil.), R. T. Dorsey (Mem.), Howard F. Ilgner (Mem.) E. J. Reeder (Mem.).

Motor Vehicle Inspection Manual. Published by the National Conservation Bureau in cooperation with the American Association of Motor Vehicle Administrators. The manual contains 123 pages and is illustrated with sixty-two charts and drawings. It is divided into six chapters each dealing with an important topic relating to the field of Motor Vehicle Inspection. This manual describes the history, purpose, value and scope of such inspection in addition to furnishing a most comprehensive program for establishing the necessary machinery on a state-wide or community basis. Featured in the last chapter are the American Standard Inspection Requirements for Mechanically Safe Motor Vehicles.

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Traffic Engineers, City Engineers or anyone who is charged with the guidance and control of traffic will be more than interested in knowing how it is possible to produce their own signs and markers with a minimum of effort and expense. Many cities and states are already using Naz-Dar Silk Screen Process Colors and Silk Screen Stencils with very satisfactory results.

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Applications for Membership

George Thomas Papageorge
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(Traffic Engineer, Division of Traffic & Safety of the State Highway Department)

Charles D. Vibberts, Director of Safety
The Ohio State Automobile Ass'n
Columbus, Ohio

Edward Isadore Shulman
1513 Washington Ave., Kalamazoo, Michigan
(District Traffic Engineer, Traffic & Safety Division, Michigan State Highway Department)

Robert Frank Royster
1326 E. Armour Blvd., Kansas City, Missouri
(Asst. Accident Prevention Engineer, American Transit Ass'n)

Joseph Henry White
Coraopolis Heights, Allegheny Co., Penna.
(Traffic Engineer of Allegheny Co., County Dept. of Works)

Traffic Engineering Handbook

On January 29th, the mimeographed complete draft of the *Traffic Engineering Handbook* which is being compiled by a distinguished group fo traffic engineers and is co-edited by Harold F. Hammond, director of the Traffic Division of the National Conservation Bureau, and Leslie J. Sorenson, City Traffic Engineer of the Chicago Bureau of Streets, was sent to the co-authors for checking and the insertion of final material.

The *Traffic Engineering Handbook* will be jointly published in the spring by the Institute of Traffic Engineers and the National Conservation Bureau. It will be a work of considerable length, as the present draft comprises over two hundred pages of typescript and the editors plan to illustrate the text with over one hundred photographs, charts and line drawings. Complimentary copies will be furnished to members of the Institute of Traffic Engineers.

Some idea of the scope of this publication may be gathered from the INTRODUCTION, which states "This *Handbook of Traffic Engineering* is the first ever to be published. It is *not* designed as a textbook; it is not written for the layman . . it is a book written exclusively by engineers and for engineers . . . a reference work with which no practicing state or city traffic engineer, no state highway engineer, no city engineer and no city planner could afford to be without."

The various sections have been written by Institute members especially competent in the specific fields covered. Subjects discussed include: Vehicle Facts, Physical Laws and Formulas; Operator Facts; Pedestrian Facts; Accident Indices, Accident Facts, etc.; Traffic Studies and Surveys; Street and Highway Design Data, etc.; Channelization, etc.; Curb and Off-Street Parking Data; Bus Stops; One Way Streets, Through Streets, etc.; Pavement Markings and Traffic Signs; Traffic Signals; Street Lighting and Visibility.

Members of the Institute who are assisting the co-editors, Hammond and Sorenson in the preparation of the *Traffic Engineering Handbook* are: George Barton, William Brandes, Howard Ilgner, Burton Marsh, Theodore Matson, Ralph Michel, Grant Mickle, Robert Mitchell, William McConochie, Kirk Reid, Hawley Simpson, Arnold Vey, and Earl Reeder.

Looking Ahead

Mar. 6, Beaumont, Texas: Southwestern Industrial Traffic League, Edison Hotel, Beaumont, Texas. F. A. Leffingwell, Secretary, 1908 Santa Fe Bldg., Dallas, Texas.

Again . .

FOR THE TENTH TIME NEW YORK CHOOSES TYPE D CONTROL

HERE is evidence of the preference for our Type D traffic-signal controllers—part of a recent repeat order for 494 being tested. They are for New York City. The selection of Type D equipment was dictated by experience with many G-E controllers already in service there. Ability to provide reliable, 24-hours-a-day operation is the reason why Type D has been the standard since 1936.

Don't just buy a timer—buy traffic control. It isn't enough for a timer to be well built; it must have the right sequence for any intersection, accurate timing controlled by a synchronous motor, provision for progressive timing of successive signals without wire interconnection. If you have a traffic-control problem, why not let the experience of New York City guide you to the right answer? Call the nearest G-E office or G-E traffic-control distributor. Or write General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

453-8

Mar. 11-12, Philadelphia, Penna.: Seventh Annual Philadelphia Regional Safety Conference. (Bellevue Stratford Hotel.) Walter W. Matthews, manager, Philadelphia Safety Council, Chamber of Commerce, 12th and Walnut Streets, Philadelphia, Penna

Mar. 31-Apr. 1, Boston, Mass.: 20th Annual Mass. Safety Conference. Lewis E. MacBrayne, general manager, Massachusetts Safety Council, 80 Federal Street, Boston, Mass.

Apr. 1-3, Pittsburgh, Penna.: Western Penna. Safety Council, 17th Annual Regional Safety Engineering Conference. E. J. Kreh, secretary, 704 Empire Bldg., Pittsburgh, Penna

Apr. 2-3, Newark, N. J.: Seventeenth Annual Eastern Safety Conference. Fred M. Rossland, secretary-manager, Newark Safety Council, 24 Branford Place, Newark, N. J.

Apr. 15 - 17, Columbus, Ohio: All Ohio Safety Congress (Neil House). Thomas P. Kearns, superintendent, Division of Safety and Hygiene, Industrial Commission of Ohio, Columbus.

Apr. 22-25, New York City: Greater New York Safety Council, Twelfth Annual Convention and Exhibition. (Hotel Pennsylvania.) Greater New York Safety Council, Inc., 60 East 42nd Street, New York, N. Y.

May 6-8, Chicago, Ill.: Midwest Safety Conference. (Hotel Sherman.) Geo. G. Traver, manager, Greater Chicago Safety Council, 222 North Bank Drive, Chicago, Ill.

May 22-24, Norfolk, Va.: Seventh Annual Va. State-wide Safety Conference. (Monticello Hotel.) Wm. M. Meyers, executive secretary, Richmond Safety Council, 30 Allison Bldg., Richmond, Va.

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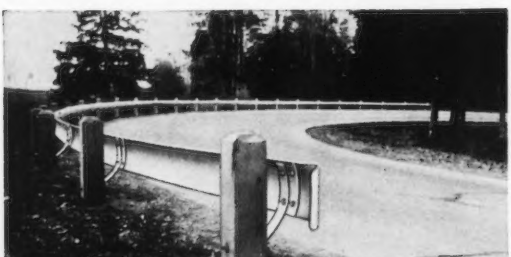

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Two States Build Test Highways to Study Design, Construction

To determine just how well a road "can take it," the state highway departments of Michigan and California have built test highways upon which theories of design and construction are studied under actual traffic conditions, the American Public Works Association said today.

Michigan's concrete highway is 18 miles long and 22 feet wide. It is open continuously to travel by the public, which in using it helps engineers learn more about concrete pavement design and correlate laboratory studies with construction methods.

Ten miles of the Michigan highway will be used to study such design elements as expansion and contraction joints, the amount of reinforcing steel necessary, and cross-section thickness. The rest of the road will be used for a durability study of concrete. The study may require from four to five years.

California's oval test track, located near Sacramento, has two straightaways each 200 feet long. The straightaways are divided into a total of eight test sections composed of different types of construction.

Built to determine best design principles of low-cost road construction, the sections of the tract are now being "tested to destruction" under the wheels of heavy trucks.

Each failure in the test panels is repaired after the position and character of the failure is noted. The surface is maintained in good condition during the test so that no sound area will be affected by the failure of an adjoining weaker section.

The oval track may furnish the answer to problems other than those of foundation and surface treatment, California highway officials say. The traffic department wants to get exact information on the relative efficiency of several simple types of automatic traffic recording devices. Traffic lacquers will be tried out on the traffic guide lines to see if any improvement can be made in the standard type of lacquer used by the state.

Unusual Exhibit Helps Baltimore Citizens Understand Planning Problems

Baltimore citizens may learn about planning problems and conditions of their city at the major exhibit—entitled "The City"—of the Baltimore Museum of Art. The exhibit opened January 17 and will run six weeks, the American Society of Planning Officials said today.

Purpose of the exhibit is to show citizens the existence of serious urban problems, suggest certain solutions, stress the necessity of comprehensive urban developments, stimulate similar exhibits in other cities throughout the nation, and emphasize the value of visual presentation of planning problems and ideas.

Although numerous illustrative examples of conditions in Baltimore are shown, the exhibit as a whole is not limited to Baltimore but treats problems of the typical city.

One feature of the exhibit is inclusion of a large section of the General Motors "Futurama" from the New Yord World's Fair.

"M P H" Abbreviation on Speed Limit Signs Legal Under New York Opinion

Use of the abbreviation "M P H" instead of the words Miles Per Hour on speed limit signs is sufficient compliance with vehicle and traffic laws to make speed ordinances legally enforceable, according to a New York attorney general's opinion.

"In view of the modern trend to adopt abbrevations wherever possible and the fact that motorists are fully aware of the meaning of the letters" the abbreviation is sufficient compliance with the law to make speed ordinances enforceable, the opinion said.

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M-B Highway Marker
(shown at right)

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Frankly Speaking

Traffic Engineering & Highway Planning

MILLIONS of dollars are being spent annually in the United States for highway construction. There is only one logical reason for these expenditures, namely, the creation of facilities for the safe and expeditious movement of modern traffic. This objective should be the fundamental aim of the highway designer.

In the horse and buggy days, of a comparatively few decades ago, the hazards of the highway were not great and traffic congestion was a rarity seldom encountered on the open road. Highway engineering of this era was largely a matter of grading, drainage and maintenance.

With the increased use of the automobile the road engineer was assigned the task of "Digging America out of the mud." In general, he accomplished this task in an effective manner and in a comparatively short period of time. It was natural that his major attention was devoted to questions of surface and sub-surface drainage, strength of surface, durability, the elimination of excessive grades or curvatures and low maintenance cost.

The rapid increase in the use of motor vehicles not only testified to the extent to which the road engineer had accomplished his task, but also created hitherto unknown problems of highway design and traffic control. The profession of highway engineering was broadened in scope. The profession of traffic engineering was born. Today these two professions are interdependent upon each other.

It is highly important, therefore, that highway engineers shall be fully conversant with the principles of traffic engineering and shall consider these principles as fundamentals of highway planning. A road may be well designed as far as structural details are concerned, but unless it provides, to the greatest possible extent, for the safe and expeditious flow of modern traffic it will fail to satisfy completely the only purpose of its construction.

Without question many highway engineers are cognizant of this situation and are giving it full consideration. There is real need, however, of giving the principles of traffic engineering an important and basic place in all highway courses conducted by engineering colleges and universities. Such inclusion will be of inestimable value to the future highway designer, will aid in guaranteeing adequate facilities to the public and will materially assist the traffic engineer in the handling of his ever increasing problem.

W. Graham Cole

Sec.-Treas., Institute of Traffic Engineers

THE ADMINISTRATION OF STATE TRAFFIC ENGINEERING DEPARTMENTS

By MAXWELL HALSEY

Editor's Note: Often the space in TRAFFIC ENGINEERING does not permit publishing detailed articles. In order to include all items of interest to our readers, it has been decided to offer such articles in separate installments. We begin this policy with this issue and offer Part 1 of this 2 Part article. In order to have a better background for this article, it is interesting to note—first, we did not have State Traffic Engineering Divisions; then we got them organized; next, we got men and trained them; now that the Traffic Engineering factory is built, how are we going to run it? I believe here is the answer!

MANY traffic divisions have reached the point where their organization — the factory — has been built and is ready to run. Naturally, sound organization is very important and must be achieved before proceeding with administrative developments. It is being discovered that the development of effective management is just as difficult as the development of some of the other stages through which traffic engineering has passed. No matter how well organized the department, or how sound and well trained the personnel, the end-product —the improvement of transportation —will be no better than its operation. The development of the management technique in a traffic engineering division is especially difficult because there are so many other older and thoroughly intrenched departments and subdivisions to deal with, and because its operations affect the daily lives of everyone.

Management of a traffic engineering department must be developed to a point where it will reduce accidents and relieve congestion. Unless this is done, it will not be possible to justify the existence of a traffic engineering division, and to obtain the proportion of the highway budget which traffic movement deserves. Unless the salary level of governmental traffic engineers is raised, the field of traffic engineering cannot continue to hold the splendid calibre of men which it has at the present time, as these will tend to move to more lucrative positions.

Internal Administration: The administrative aspects of the problem involve the relationship between the traffic engineering division and other departments and subdivisions of government. No traffic engineering organization can operate successfully or, for that matter, exist if it does not properly handle its relations with the following units of government:

(1) Other subdivisions of the highway department
  (a) Commission, administrator and chief engineer
  (b) Surveys and plans division
  (c) Project division
  (d) Location and design divisions
  (e) Bridge division
  (f) Right-of-way division
  (g) Design division
  (h) Roadside development division
  (i) Construction division
  (j) Finance and accounting division
  (k) Maintenance division
  (l) Purchasing division
  (m) Public Relations division
  (n) District engineers
(2) Other state government units related to traffic:
  (a) State police or highway patrol
  (b) Motor vehicle department
  (c) Board of education
  (d) Utilities commissions
  (e) Conservation department
  (f) Planning board
  (g) Industrial division
  (h) Railroad commissions
(3) City and town officials
(4) County highway officials
(5) U. S. Public Roads Administration

The administrative problem begins within the highway department. The mere fact that the commission or the chief engineer has issued an administrative order setting up the division does not solve the problem. Because

the traffic engineering division must take certain powers, budget and personnel away from other divisions which have had them a long time, this change will be resented in most cases. Due to human nature, division heads seldom, if ever, desire to lose authority, manpower or funds which they had previously.

The chief executive and the commission may be in favor of the idea in a general way, but in some cases they may not realize all the implications. Therefore, the traffic engineer must spend the necessary time with them to create a complete understanding and to insure their full support. This should include a strong administrative order, a personal plea for cooperation and assistance, and a general meeting at which the change may be thoroughly explained.

Naturally the traffic engineer should plan an active part in determining where new highways are needed. The project division usually starts the action on all new roadways. The traffic design engineer of the traffic engineering division should participate in this at the time the center line is laid down, or better still when general locations are being considered. Otherwise the best traffic design, from the traffic standpoint, may not be possible, owing to geographic limitations. It is unwise to wait until after the center line is placed, for any plan once made is usually difficult to alter.

The traffic design engineer of the traffic engineering division should work hand in hand with the design division to the end that the best geometric design may be worked into the plans of the physical or structual design. Frequently conflicts will arise between the traffic movement requirements and the physical construction requirements for the reason that one plan will cost more than another. It is for this that the position of traffic designer in the traffic engineering division should be established — to guarantee that the traffic safety and congestion point of view will receive full consideration. Either point of view alone would be incomplete. This places the chief engineer in the position of judge, to arbitrate differences of opinion. The same reasoning applies to the bridge division.

Cooperation with the construction division is necessary to insure that no serious changes detrimental to traffic movement are made during the construction process, such as surface types, pavement colors, lighting, reflectors in curbing, etc.

There is special need for cooperation with the maintenance division. The work of this division may be inconvenienced by some traffic engineering proposals, and misunderstanding may develop if their importance is not explained to the head of the maintenance division.

The traffic engineer should work closely with the public relations division to insure that traffic engineering activities receive their just share of public relations action. This should be easy to achieve, as traffic engineering activities have higher visibility values and more public interest than any other activities of the highway department. Every motorist sees signs, signals, markings, islands, and gets the "feel" of good traffic design, while few motorists can appreciate good planning, construction, or soil mechanics practices.

In highway departments in large states, where administrative plan is decentralized, the district engineer has strong authority over activities in his district. Under these circumstances, the traffic engineer must work closely with him if his plans are to be carried out, and the district engineer should regularly co-operate with the traffic engineer.

Administrative Procedures: The second basic administrative problem is that of procedures. All new organiza-

tions have a tendency to deal with each individual problem as it arises. On this basis of operations the work piles up, and so much time is spent "fighting the pile" that no time is available for finding better, quicker or more efficient methods of accomplishing the same thing. One of the best ways around this difficulty is for experienced people to reduce most general operations to routine procedures. This serves to channelize the effort and develop patterns which can easily be followed without having to work out a new system for each case. These should be reproduced in a manual and should include such typical things as the following:

(1) Requests for or complaints about signs, signals
(2) Typical surveys and all field investigations
(3) Form letters and interdepartmental memoranda
(4) Filing of letters, materials and reports
(5) Follow-up on most hazardous or delay locations

Other important procedures are the routing of work, specialization, the shifting of some work to other agencies and more coordination between offices.

Codes and Manuals: The third administrative process is the code or manual. The purpose of this is to reduce to a printed form those best ways of doing things which are agreed upon and become the standard. From there on, the chief traffic engineer or any of the major assistants will not have to review each case, but can save time and work more efficiently by dealing only with exceptions. Standards will always have exceptions and must be changed from time to time as better methods develop. But standard codes can handle the bulk of cases, produce more workmanlike jobs and save much time, confusion and money. Standard manuals or codes should be prepared for such typical things as the following:

(1) Sign manual
(2) Markings manual
(3) Signal manual
(4) Channelization manual
(5) Intersection redesign manual
(6) Intersection design manual
(7) Traffic design manual for tangents
(8) Control of access design manual

Later some of these might be combined into one manual.

Approvals and Permits: The fourth process is that of approvals and permits. Forms for these should be prepared and their handling channelized so that the authorization moves along without any delay. If investigations are required, there should be a report form. If it must be checked against a manual, there should be a statement as to the success of the checking. The routing of this process is complicated and must be worked out carefully to avoid overlap, duplication and delay.

Fiscal Control: The fifth administrative process is that of fiscal control. Budgets must be projected in advance. They must be justified by adequate reports. The expenditure of the funds must be allocated on a preference basis and held to time schedules. Replacements and major improvements must be worked out over a period of years. Authority for expenditure must be established and the proper forms prepared. An audit system must be developed. Unless all monies can be accounted for and the benefit of their expenditure proved, it will be difficult to justify increased appropriations. In the long-run, all traffic engineering activities which lessen accidents and congestion must be reduced to dollar value. Only by this process can the highest efficiency be developed in which the monies are spent for such things at such places as to produce the greatest return per dollar invested. Traffic engineers should not be restrained from doing this by the current differences of opinion as to the accurate amount of money that should be assigned to the delay factor or to

the relative severity of each accident. Regardless of the degree of accuracy, dollar figures have great comparative values as long as the figures are used consistently. The dollar is the only common denominator which can be used to link up income and expenditure values. Furthermore, it is the one denominator with which the public is familiar.

Public Relations — Politics — Public Education: The sixth administrative process is that of public relations, politics and public education in support of a sound traffic engineering program. It is important that the traffic engineer have a clear concept of his job. He is a public servant employed by the motorists through the motor users' taxes to give the motorist faster, safer and more economical automotive transportation. If the motorists and the public feel that he is doing that, they will support his program; otherwise they will not support him. Since the motorist is not a traffic engineer —although he is likely to consider himself an expert—he will judge the program exclusively by what he sees and hears. This condition proves that the mere doing of a good traffic engineering job is not adequate to get support for the program unless what is being done is constantly held up before the motorist and explained to him. It also indicates that the type of traffic engineering activity that has a high visibility factor and can readily be seen by the motorist has more sales value regarding the program than has those activities which are not seen so easily or understood so quickly. Thus the traffic engineer in need of more public support would be wise to use all the signs, signals, markings and islands that can be justified by traffic conditions, for these are the tangible evidence of his work for the motorist. In this regard well marked routes are of very great importance.

At this point the practical traffic engineer may say, "That's all very well in theory, but the truth of the matter is that the support and funds come not from the public, but from the heads of government and that pleasing the public may not result in getting the support." Certainly in many jurisdictions the political heads control the administration and the funds. Under these circumstances, progress cannot be made by staying away from political appointees. Progress can be made only by being courteous with them and striving to find a common ground where both his desires and that of traffic improvement will benefit. This may seem difficult. However, those in political positions have constituents. These constituents are the same motoring public that the traffic engineer is trying to please. If they are pleased, the influence of their feelings will be felt by the political office-holders. In the long run, the latter must give the people what they want — although there may be a considerable lag between when the public decide what they want and when the political worker gets around to giving it to them. But this lag does not change the fundamentals. It may be a serious inconvenience, but it should not alter the sound process of getting support by pleasing the public. If the public is not pleased in the long run, then merely pleasing the political heads will not save the traffic engineer. The political heads naturally try to convince the public of the soundness of their ideas. The traffic engineer should consider the motoring public as his constituents and likewise try to influence them in favor of his ideas. If his influence is strong enough—and he is not blocked by politics, he will win.

Some students of traffic control have said that the thing to do is to get traffic out of politics. By this they probably meant that no progress could be made unless the traffic engineer could be freed from political influence in a

negative direction. The author believes that the thing to do is to get traffic into politics—but only in such a way as to secure the support of political heads for a good program. This does not mean that the traffic engineer should become a political worker in the generally accepted meaning of the term. Certainly it does not mean that he should carry on such political activity as making political speeches, throwing the support of his office for a particular candidate or party or granting political favors. Rather, it means that good sound traffic engineering projects should be brought to the attention of the controlling political heads and the values to the public and the constituents of affected areas pointed out. This must be done to prevent the blocking of these plans on the one hand and the giving of administrative and financial support on the other. This does not mean that the traffic engineer in his own personal capacity cannot express personal opinions—but not as putting his office on record. It is not possible to get traffic out of politics without reforming government. The traffic engineer is not a trained reformer and if he gave the time this would require, he would not be able to do any traffic engineering. Since present government cannot be changed or reformed, except over a long period of years, the only basis for successful operation is for the traffic engineer to work with the political heads and strive to sell them on the idea that the sound program he would like to put into effect will be popular with the public and will get votes of the constituents, provided the political head receives adequate credit for the improvements. This type of program has proved effective. It presupposes that the traffic engineer should not look upon every political worker as a nefarious person and that he give him credit for being experienced and expert in his particular field. It means that the traffic engineer under particularly critical conditions must be willing on rare occasions to grant a few innocuous requests for paint and signs where they will not be harmful in return for support for his program. Wherever possible, the political request should get at least a little action rather than a super professional one hundred percenter engineering "no"! Again this does not mean that the traffic engineer should not discuss the engineering measure of each issue—he should, but he should employ a sales process in doing it. Few political appointees will respond to the slide rule, but most will consider reason, especially if it affects their constituents.

The fundamental point is that technical information and expert personnel alone will not get the job done. The public must be "sold" for long-run support. The heads of government and the political workers are important factors which cannot be cast aside. The traffic engineer must work closely with them to obtain their support, but must refrain completely from all outward political activities. Unless this approach is made, the traffic engineering department will just get along, until the administration changes, will be hampered in its operations, or will be thrown out if the political group are antagonized and are strong enough.

Part 1 of an original article by Maxwell Halsey (Mem. I.T.E.), Associate Director, Bureau for Street Traffic Research, Yale University.

(Part 2 will be published in the April issue of TRAFFIC ENGINEERING.)

TRAFFIC ENGINEERING IN THE SMALL COMMUNITY

By HAROLD F. HAMMOND

THE employment of a full-time, well-qualified traffic engineer by every city with over 50,000 population is a goal that many organizations and individuals are striving to reach. This goal is a worthy one, and one which is rapidly being attained. What is being done, however, about making the services of traffic engineers available to the smaller communities; that is communities of 15,000, 25,000, and the like? Certainly no one will question but what these small communities need competent traffic engineering. Frequently their problems are proportionately more severe than those found in the larger cities. What, then, are the possibilities of traffic engineering being applied to these small communities?

The lack of adequate funds and the failure to appreciate the value of traffic engineering are among the major reasons why this growing profession has not been more readily accepted by communities in general, and small communities in particular. Assuming that the small community does appreciate the value of traffic engineering but does not have sufficient funds to employ a full-time traffic engineer, what can it do about it? There are several possibilities open to the small community for obtaining traffic engineering service, all of which are in effect in one or more localities. These are: assistance from the state traffic engineering department, help from the county traffic engineer, employment of a consulting traffic engineer, the services of traffic engineers employed by organizations willing to offer limited assistance on a gratis basis for the purpose of demonstrating what can be accomplished, and traffic engineering work by the city engineering department. In addition to special traffic engineering work from one or more of these possibilities mentioned, the police departments in many communities conduct limited traffic engineering activities. Let us briefly discuss each of these possible sources of traffic engineering assistance for the small community.

A majority of those states having state traffic engineering departments do not have a large enough traffic engineering personnel available to aid the smaller communities. The best that they can do is to help solve an isolated problem now and then. Moreover, such problems usually tie in with a state highway in some way. The conclusion that we draw, therefore, is that state traffic engineering departments are seldom in a position to offer adequate traffic engineering assistance to the smaller community, either in accordance with the request of the community or in proportion to the severity of the traffic engineering problem.

Few county traffic engineering departments exist. Why more have not been created is quite another subject. Doubtless, the county engineers have not been educated or adequately sold on the value of traffic engineering and are reluctant to assume the responsibility of traffic engineering activities. The arguments presented later in this paper regarding the city engineer and the traffic engineer apply equally well to the county engineer. In any event, the few county traffic engineering departments that do exist do not have a sufficient number of experienced traffic engineers available so that they can lend these men to small communities in an assisting capacity.

Community employment of consulting traffic engineers would seem to be a logical answer to the question. In practice it does not work out so well. Often the small community's traffic engineering problems require only two or three days' engineering assistance at any one given time. For a qualified consulting traffic engineer to serve a community for such a short time requires his charging a high daily consulting rate. This rate is usually prohibitive to the small community; or so it appears to them. A solution which has worked out well in many sections of the country when employing a municipal engineer may also be applied to the employment of a consulting traffic engineer; that is, a group of small communities in one section of the state would get together and maintain a consulting traffic engineer on a full-time basis. Through this procedure, it is possible for the consulting traffic engineer to cut down his fee to almost a straight salary basis, requiring very little in addition for his expenses to and from each job. Such an arrangement may cut the fee to as little as one-third of the straight consulting traffic engineer's fee.

Limited field consulting work provided on a gratis basis by traffic organizations will never be able to handle all the demands. Furthermore, such a service can never be considered a solution to the problem. While it will serve as a good stopgap in many instances and will do a world of good in demonstrating techniques, it can never be expected to develop on a scale sufficient to meet the demands of the small communities. Organizations engaged in this type of work today are primarily interested in showing what can be done and in encouraging the small communities to establish a permanent set up that will take care of their traffic engineering problems.

The logical group to conduct traffic engineering in the smaller community appears to be the city engineers. A city engineer is charged with the responsibility of developing and providing improvements for the community which will make it a safer, healthier, and more enjoyable place in which to live. Certainly the solution of traffic problems comes under this heading.

The construction and maintenance of adequate and safe streets and thoroughfares, plus the provision of adequate devices such as signals, signs, markings, islands, and so on, which facilitate the safe and smooth flow of traffic should certainly be a major concern of the city engineer of a small city. The design and redesign of streets should go beyond the provision of a mere surface over which vehicles and pedestrians may travel. It should also include provisions to compensate for human and vehicle limitations. Neither is it sufficient, when aware of a "dangerous location" or a street that is being used as a speedway, to put up a few warning signs or "pass the buck" to the police department. The problem calls for intelligent, scientific study leading to a solution which will definitely ameliorate or eliminate the condition. Logically, it is the duty of the city engineer in the small community to possess the necessary training which will permit him to make the sort of improvements which traffic engineering techniques have demonstrated are best and most efficient. Only if he can do this will he be completely serving his city.

Unfortunately, far too many city engineers still look upon traffic as something with which only the police should be concerned. They say that it is none of their business. Many maintain this attitude because of lack of knowledge about traffic engineering and what can frequently be accomplished through simple application of engineering techniques when applied to the traffic problems. Others, however, steer clear of traffic engineering

because they feel that it will involve them in too many "headaches." They have formed the impression that anything dealing with traffic means more complaints, more problems, and more work.

Those same city engineers, that frown upon traffic, frequently complain that their profession is being overlooked in the general advancement of all professions. They fail to realize that traffic engineering has a human interest angle. They also fail to realize that any type of work that has a close bearing on the lives of the general public receives greater public attention, interest, and support if properly and competently performed.

With even an elementary knowledge of the techniques of traffic engineering, such as may be obtained through study of the traffic engineering examples and other publications in this field which have undoubtedly been brought to his attention from time to time, the city engineer can take many well-directed steps toward attacking the local traffic problem. By following proved procedures, he can make an analytical study of the traffic accidents at dangerous locations which will undoubtedly suggest to him various remedial measures which may readily be put into effect and which will "Get Results." He can take steps toward improving the visibility at blind corners. Frequently this may be accomplished by merely seeing that a few trees and hedges are trimmed or removed. He can keep a watchful eye on the condition of traffic signs, pavement markings and so on, to make sure that they are repainted whenever necessary. Again by following recognized traffic engineering principles, he can make a study of the speed and volume of traffic at principal intersections, and retime the traffic signals so that they will ensure a smoother and safer movement of traffic. He can increase curb radii at many sharp corners, and thus reduce or eliminate the hazard caused by vehicles having to swing out into the line of approaching traffic as they round such corners. When redesigning wide thoroughfares, he can often construct medial strips thereby eliminating the possibility of head-on collisions. Frequently he can correct dangerous and confusing conditions at intersections by installation of channelizing and pedestrian islands. Because he is well-informed concerning local real estate ownership and values, he can campaign effectively for the provision of municipally-owned off-street parking facilities. He can institute street lighting improvements that will reduce the night accident hazards.

It is quite apparent, therefore, that the small city engineer can make his work in the community more valuable if he broadens his conception of his work to include employment of traffic engineering methods. Today special state-wide traffic engineering conferences, short courses and even full-year courses are being given which will permit the city engineers to learn the application of traffic engineering principles to local traffic problems. The city engineer who assumes the responsibility for solving local traffic problems will perform an invaluable service toward fulfilling the great demand for part-time traffic engineering work existing in so many communities today—and, incidentally, strengthen his own position is his community.

An original article by Harold F. Hammond (Mem. I.T.E.), Director, Traffic Division, National Conservation Bureau.

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APPLYING THE HUMAN FACTOR IN TRAFFIC PLANNING

By EARL J. REEDER

TRAFFIC administration should help drivers and pedestrians get where they want to go. It should be planned and conducted for the convenience, safety, and movement of traffic rather than for making traffic conform to the convenience of administration.

Early traffic restrictions were often quite extreme. They were frequently based on opinions of individuals or small groups who felt that it was necessary to "crack down" on drivers to make them protect themselves and others. That assumed that most drivers didn't know what was good for them and were not especially interested in finding out. It assumed, also, that most drivers had no concern for the safety of others, especially pedestrians.

Fortunately, that is changing. It had to change because the assumption was not sound. Drivers began to violate unreasonable regulations frequently and efforts at enforcement of such regulations proved futile.

Time has been an important factor in this change. Years of experience for some drivers and training for others are gradually establishing more definite patterns of driver performance under given road conditions. As this progresses the planning of traffic administration to help traffic becomes even more necessary and increasingly practicable.

The function of good traffic planning is to make it easier for traffic to do the right thing and avoid the wrong one. Given a fair chance to foresee what is ahead traffic generally does the right thing anyway, but where there is uncertainty and it is not easy and natural to foresee hazards, some drivers and some pedestrians do the wrong thing and get into trouble.

When the same traffic passes one point safely and has numerous accidents at another the latter generally cannot be blamed on the traffic. It must be that physical conditions or control measures are not adapted to the traffic at such points.

This is particulary obvious where the accidents are of a definite pattern, involving traffic from one or two directions while that from the other direction proceeds safely. The patterns of these accidents reveal the movements that need help and then points the way to proper safeguarding and regulation. The collision diagram, long known to and used by traffic engineers, is a good example of the application of the human factor in traffic planning.

A location that has an unusual number of traffic violations compared with others carrying the same traffic is itself violation prone, rather than the drivers. There is no reason why traffic should be more apt to violate the same restrictions at one location than at another if conditions are the same. But, where violations are frequent the traffic engineer had better look for the conditions which make it difficult for drivers or pedestrians to know what the restrictions are or the restrictions that are too great.

In 1934 a study of Stop sign obedience at several hundred locations in many parts of the country showed that where serious view obstructions made required stops reasonable the obedience was high. Where the view was "open" and less speed restriction was necessary, obedience was lower. The definite inverse relation between critical speeds at intersections and Stop sign obedience demonstrated

again the importance of taking into account the characteristics of drivers in imposing restrictions that are intended to help.

A law that is commonly violated throughout the city or state is either too advanced or it is obsolete. It may be too advanced because the public has not been informed concerning the need for it. Ordinances requiring pedestrians to obey Stop and Go signals have sometimes failed for lack of adequate public education. The public has revolted and the law has been repealed. In other cities where adequate public education preceded the actual enforcement the law has stood the test and been successful. It expressed the will of the vast majority of the pedestrians in such places and this majority supported the enforcement of the measure against the dissenters.

A law that has outlived its usefulness or has not kept up with traffic dangers cannot long be enforced. The public revolts against it and refuses to obey. Enforcement becomes futile because too large a percentage of drivers or pedestrians disobey.

So many factors are involved in some traffic problems that proper evaluation of driver practices is about the only way to develop the solution Take, for example, the establishing of speed zones. In approaches to intersections and on curves critical speeds can be determined from measurable conditions and well known formulae. But, on a road through a rural district with special conditions, such as an unusual number of pedestrians, numerous parked cars or some other conditions the hazards of which cannot be readily evaluated, the problem is different. The different factors cannot be segregated and evaluated from the observation of physical conditions. They cannot be easily combined to give a composite result. So another method has to be used.

One such method is to observe the speeds of many drivers through this section. The percentage of the total number observed that pass at or below different speeds are plotted against the speeds in a cumulative distribution curve.

This curve will usually be fairly smooth and regular in form up to some rather high percentage, where it breaks quite abruptly and then gradually aproaches the 100 per cent line, representing the top speed observed. This break point can be considered the critical speed for the vast majority of drivers within this section. Those who were observed above this speed were either unusually expert, unfamiliar with the hazards, or just plain reckless.

The National Safety Council's Committee on Winter Driving Hazards is using this procedure in determining the critical speeds for different kinds of slippery road surfaces in winter. Observations are taken on thousands of vehicles on many different kinds of winter road conditions. Many observations are taken at each point and cumulative distribution curves are drawn. The speeds at which the break points occur are considered the critical speeds for the type of roadway and the conditions. The many sets of observations will be thus treated for comparison and conclusions will be drawn from these concerning maximum safe speeds for different types of winter roads.

Human characteristics of drivers and pedestrians need to be determined and evaluated in many cases and in numerous ways in planning the traffic administrations of the future. This must be based on the belief that the vast majority of drivers desire to drive safely and the vast majority of pedestrians desire to walk safely.

The application of this principle is not a matter of interviewing a great many drivers and finding out what they think about a given condition.

Rather, it is a matter of finding out what they do about it. Many drivers and pedestrians are not able to say accurately what they would do concerning different traffic situations. They do not know how fast they drive on slippery pavements. The safe way is to find what they do about it by observing their performance under normal conditions.

No data are more important to the traffic engineer in dealing with traffic problems than the actions of drivers and pedestrians under different conditions. These people are the raw material that must be put through the traffic "machine." Just as the machinery in a factory must be adapted to the materials that it must handle, so must the highway and its restrictions and safeguards be adapted to the drivers and pedestrians that it must serve. That means knowing how they act under different conditions and adapting the conditions to them. It is easier to adapt conditions to drivers and pedestrians than it is to change human practices.

An original article by Earl J. Reeder (Mem. I.T.E.), Chief Traffic Engineer, National Safety Council.

IN AND OUT, SAFELY

By GEORGE B. HOUSTON

TUCSON, like most other cities throughout the country, constantly needs more and more parking space—every foot it can get.

But prior to 1939 we found that we were actually losing parking space, especially on the fringes of the business district.

We had the same streets, but curb parking space became less and less every month. Why? Simply because it was being butchered unmercifully for driveways.

Filling stations, used car lots, soft drink stands and similar enterprises chopped out about as much curb as they could for driveway purposes.

Meanwhile, the need for parking facilities was increasing daily. It was impossible to maintain traffic safety and efficiency.

What did we do? First, we made extensive surveys to determine proper driveway width and driveway construction practices. The survey information was given to the City Council.

The result was that the Council adopted an ordinance in May, 1939, which specifies a maximum width for driveways and limits their location with respect to corner lots. The ordinance reads in part:

> It shall be unlawful for any person, contractor, firm, company, or corporation to remove or change any curb now or hereafter existing within the City of Tucson, without first having obtained written permission from the Superintendent of Streets of the City of Tucson.
>
> Such permit will not be granted for curb-cuts within 20 feet of the intersection property lines at street corners, nor for curb-cuts for a driveway wider than 25 feet, or steeper than a one to eight slope from the bottom of the depressed curb.

Although the ordinance has proved successful and practical, there is a great deal of flexibility in its application. The most debatable point is the 20-foot restriction from corner property lines. Most filling stations feel this restriction is too severe.

Undoubtedly greater frontages often are required for an efficient filling station layout. For safety's sake, nevertheless, there is reason to believe that the restriction is justified.

An intersection is the point of greatest concentration and complica-

tion of traffic in the street system. It is here that vehicle movements turn to the right or left, and pedestrian movements are intermingled. Possible points of conflict between vehicles, and vehicles and pedestrians are numerous.

Every effort should be extended to avoid the introduction of additional troublesome movements which can arise from the construction of commercial driveways too near an intersection.

Curb-cuts too close to an intersection have the undesirable effect of additional street approaches and invite innumerable hazardous and unnatural vehicle movements. Experience has shown that removal of the driveway a short distance from a corner reduces to a minimum or entirely eliminates freakish and unwarranted maneuvers.

The question is: "How far from the corner should driveways be prohibited?" There may be any number of answers, but the most logical one seems to be that driveways should be prohibited only that distance from the street corner which is necessary to insure a natural movement of vehicles through the intersection.

There must be a distance sufficient to permit aligning a vehicle with the normal traffic path, prior to entering an intersection. The vehicle then can pass through the intersection in the usual manner and not conflict with the movements of other cars.

The 20-foot restriction in Tucson has caused negligible complaint. Not once has the administrator had to fall back on the fact that it was just another ordinance which must be obeyed.

The driveway ordinance, of course, follows the principle of the greatest good for the greatest number. There is the human element involved in any traffic ordinance, or an ordinance indirectly affecting traffic.

If drivers had no restrictions at all, naturally they would follow the path of least resistance. And at times the driver would be apt to create traffic disturbances by inability to coordinate his actions with those of other drivers. He is prone to subordinate the wishes of other motorists and pedestrians to his own desires.

Thus it has been necessary to regulate the motorist's actions through physical restrictions such as the driveway ordinance.

Within urban areas there can be little question as to the sufficiency of 25 feet as the net driveway width, with curb slopes of one to eight. This results in a gross width of approximately 32 feet where there is a six-inch curb.

At locations where the entire frontage is used for driveway purposes, the decision as to the proper point of entry and exit is left entirely to the judgment of the individual driver.

This type of construction allows no control whatsoever on turning movements. It invites driver action that would not be tolerated elsewhere. The motorists in the street have no idea at what point an automobile might emerge or decide to enter. The pedestrian is left to the mercy and judgment of vehicle operators.

Thus, the ordinance, which limits the width and location of driveways, has minimized many of the elements of surprise and sudden decisions that so often affect human judgment.

We must assume that motorists are reasonably careful when they enter or leave commercial driveways. At least this assumption must be used as a fact until we have a more complete recording of the number of accidents at or in driveways.

Although reported vehicle collisions within filling station driveways are practically nil, according to our investigations during 1940, there is reason to believe that in many instances vehicles entering or leaving such properties may have had a contributing in-

fluence on the accident experience of an adjacent street.

Tucson's driveway ordinance does not contain restrictions on the length of an island between driveways, or curb parking adjacent to driveways. These items should be added.

An island between two driveways leading to a single piece of property should be long enough to permit parking of at least one vehicle.

The practice in Tucson is to require 16 feet of uncut curb, exclusive of the one to eight slope on either end. This permits parking an average vehicle with no encroachment on the driveway proper.

It has been argued that all encroachments on a driveway by a car parked at an island would not detract from the efficiency of the driveway. Experience shows, with the exception of exceedingly narrow driveways, that the first few feet of a driveway, adjacent to a dividing island, are rarely used.

Quite conversely, we require an eight-foot length of uncut curb to separate the driveway from an adjoining property. The reason for this is physical — to prohibit parking at that location.

It is at the extremities of the property where parking really obstructs driveway use. There are many cases where the driver pulls out of a parking space adjacent to a driveway and collides broadside with another motorist who has started to enter the driveway.

We feel it is unsafe to permit parking between drives serving separate properties or to allow parking within six feet of a driveway at the property line.

Tucson's driveway restrictions are designed to protect the pedestrians as well as the motorist. Driveways which conform to the ordinance allow at least some distance for the pedestrian to decide whether it is safe to step into a driveway.

Application of the entire ordinance would seem to be an attempt to make new construction economically unsound. But the results have been to the contrary. There has resulted a better type of construction and it has added to rather than detracted from economic and social values of the property and surrounding properties.

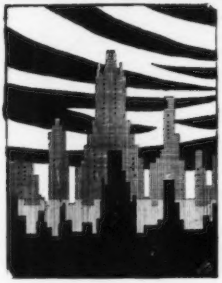
The continued success of the ordinance, as well as any regulatory measure, will depend entirely on an intensive survey of its effects and the degree to which the ordinance is enforced.

An original article by George B. Houston, Traffic Engineer, Tucson, Arizona, appearing in PUBLIC SAFETY.

Support the Advertisers

For some months now, "Traffic Engineering" has been accepting advertising from various organizations over the country interested in presenting their products for the consideration of our readers. Only through the support of our advertisers and the cooperation of the membership of the Institute of Traffic Engineers can we continue to expect the building up of a fine professional journal. It is the belief of the Editorial Staff of the magazine that all our readers will be interested to know that every advertisement in "Traffic Engineering" is accepted and passed upon only after careful investigation into the quality of the product it advertises. Every advertisement is read and checked as to the integrity of the statements regarding products which are advertised. For this reason we urge the readers of "Traffic Engineering" to consider as much as possible those products recommended through the pages of "Traffic Engineering."

When writing advertisers, please mention TRAFFIC ENGINEERING



Stop, Look and Listen

They're in the Army Now!

Harry E. Stedman (Mem. I. T. E.) former Traffic Engineer of Des Moines, Iowa, has been ordered into active duty at Fort Benning, Georgia. He is stationed at Fort Benning, attending the Refresher Course for Infantry Officers and is a Lieutenant-Colonel commanding the Second Battalion of the 168th Infantry.

A. A. Hayton (Affil. I.T.E.) former Chief Traffic Officer of the Johnannesburg police department, South Africa, has been called into active service with the British South African forces.

Congratulations!

Lloyd Blanchard (Affil. I.T.E.) former Eastern Representative of the National Safety Council has recently been appointed Chief of the Safety Section for the Construction Division, office of the Quartermaster General of the War Department in Washington, D. C. Mr. Blanchard, who has had years of experience in both public and industrial safety work, came to the National Safety Council after having served as Executive Secretary of the Governor's Committee on Street and Highway Safety in Massachusetts. He was also manager of the Springfield, Massachusetts Safety Council from 1925 through 1929, and prior to that was for a number of years Personnel Manager with the National Equipment Company in charge of employee safety.

James G. Hayden (Assoc. I.T.E.) former Fleet and Traffic Engineer for the National Safety Council, has recently been appointed as Fleet Engineer with the Horton Motor Lines, Inc., of Charlotte, North Carolina. He is to assist Moyer B. Speir, Jr., Director of Safety and Personnel of the Horton Lines. Mr. Hayden came to the Council in 1936 from the Michigan Highway Department, where he was Traffic Engineering Field Supervisor for the Michigan Highway Planning Survey. He is a graduate mechanical engineer of Michigan State College.

Isaac T. Cabrera (Jun. I.T.E.) former Consulting Engineer, Ramos & Cabrera, has been appointed Safety Engineer for the Mene Grande Oil Company (Gulf Oil Corp.) Barcelona-Venezuela, South America. He left February 21 for his new position and will have the responsibility of handling the Fleet and Industrial Safety Program for this organization.

Red and Green Neon Signs Charged with Creating Traffic Hazard

Charges that red and green neon advertising signs create a serious traffic hazard and depreciate property values are made in a recent report issued by the City Club of New York City. The report urges the passage of a local law prohibiting the display of any new illuminated signs containing red or green colors less than thirty-five feet above the street level. The proposed law would not affect existing signs until there was a change of ownership of the sign or of the business or activity it advertised.

National Safety Council Engineering Changes

Harvey D. Booth, former Supervisor of the Arkansas State Highway Department's Division of Traffic and Safety, joined the staff of the National Safety Council's Traffic Engineering Bureau on February 17th.

Mr. Booth's duties will include traffic engineering and traffic enforcement studies. He will be Secretary of the Council's Committee on Pedestrian Control and Protection and he will also be the staff representative on the Council's Committee of Traffic Court Judges and Prosecutors.

He was graduated from Arkansas College with an A.B. degree and did graduate study at the University of Southern California. He later received a law degree from the Arkansas Law School.

Rufus G. Jasper (Assoc. I.T.E.) a Traffic Engineer for the National Safety Council since 1938, has been made Fleet Engineer for the Council. Mr. Jasper has served as Secretary of the Council's Committee on Pedestrian Control and Protection and the Committee on Night Traffic Hazards. He is a graduate of the University of Maine, where he obtained the B.S. and M.S. degrees in Civil Engineering.

T. H. Dekker, formerly with the Zurich General Accident and Liability Insurance Company in Chicago, has been appointed Assistant Traffic Engineer for the National Safety Council. Mr. Dekker was graduated from St. Olaf College in 1937, majoring in Science and Sociology.

New Applications for Membership

Daniel Andrew Branigan,
621 N. Galena Avenue,
Dixon, Illinois.
(District Traffic Engineer for District #2, Illinois Division of Highways.)

Joseph J. Feuchter,
6320 Tholozan Avenue,
St. Louis, Missouri.
(Engineer (Efficiency) and Traffic, 322 City Hall, St. Louis, Mo.) Applying for transfer in Membership.

Richard W. Siver,
119 Livingston Avenue,
New Brunswick, New Jersey.
(Traffic Engineer, Dept. of Public Safety, City of White Plains, N. Y.)

Robert Dean Shiffer,
928 N. 15th Street,
Milwaukee, Wisconsin.
(Supervisory Foreman, Work Projects Administration.)

William Havard Mann,
Market House,
Nashville, Tennessee.
(Asst. Traffic Engr., City Planning & Zoning Commission, Nashville, Tennessee.)

First Minnesota Traffic Engineering Conference

A state-wide traffic engineering conference is scheduled to be held from March 25th to 28th at the University of Minnesota, under the joint sponsorship of the Center for Continuation Study at the University of Minnesota, the Minnesota Department of Highways, and the League of Minnesota Municipalities. Members of the Executive committee in charge of arrangements for the Minnesota Conference are: Walter F. Rosenwald, Conference Chairman (Traffic Engineer, Minnesota Department of Highways and Mem. I.T.E.); Harold F. Hammond, Conference Co-ordinator (Director Traffic Division, National Conservation Bureau and Mem. I.T.E.); C. C. Ludwig (Executive Secretary, Minnesota League of Municipalities); and J. M. Nolte (Director, Center for Continuation Study, University of Minnesota).

Institute of Traffic Engineering members living in Minnesota and neighboring states take notice, and plan to attend the First Minnesota Traffic Engineering Conference!

ELECTRIC SIGNALS

Standard signals adapted for all types of mounting. Synchronous and induction control mechanisms and accessory devices.

REFLECTOR SIGNALS

When signs are not enough or expense is a factor, reflector signals keep down both cost and accident rate.

10″ x 18″; Nine 1⅝″ Stimsonites

8″; Six 1⅝″ Stimsonites

15″; Six 3″ Stimsonites

REFLECTOR SIGNS

Large Stimsonized and standard reflector button signs for all traffic conditions.

60″ SIGN 18″ LETTERS

24″ SIGN 6″ LETTERS

DELINEATORS

Reflector Delineation gives essential road information after dark at daylight distances. The alignment and driving limits of the road are outlined by a channel of light.

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SS SIGNALS

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The First Illinois Traffic Engineering Conference

Members of the Institute of Traffic Engineers who lectured at the First Illinois Traffic Engineering Conference, held from February 11th to 14th inclusive at the University of Illinois under the joint sponsorship of the University of Illinois' Department of Civil Engineering and the Illinois Division of Highways, included:

C. C. Wiley, Professor of Civil Engineering at the University of Illinois, who spoke on *The Parking Problem;* Harold F. Hammond, Director of the Traffic Division of the National Conservation Bureau, who spoke on *Why Traffic Engineering* and *Engineering for the Pedestrian* and who also conducted a *Round Table Discussion* on the closing day of the Conference; George W. Barton, Director of the Safety and Traffic Engineering Department of the Chicago Motor Club, whose subject was *Interpreting Traffic Accidents and Field Facts;* Harry H. Harrison, Traffic Engineer of the Illinois Division of Highways, who discussed the *Legal Aspects of Traffic Control;* Otto K. Jelenik, Traffic Engineer of the Chicago Park District, whose topic was *The Application of Signs and Markings;* Dr. Donald S. Berry, Traffic Engineer of the National Safety Council, who delivered lectures on *Vehicle Behavior and Limitations* and *The Study and Control of Speed;* William C. Brandes, Traffic Signal Engineer of the Chicago Bureau of Streets, whose topic was *The Application of Traffic Signals;* and William R. McConochie, Traffic Engineer of the Chicago Surface Lines, who spoke on *Street Intersection Design.*

The conference, which was the first of its sort ever held in the United States, was a pronounced success, being attended by one hundred and six

engineers from Illinois and three neighboring states. Of those attending, forty-two were state, six county, and twenty-six municipal engineers.

Arrangements for the conference were under the direction of the following Executive Committee:

Professor Wiley, Conference Chairman; Mr. Hammond, Conference Coordinator; Mr. Harrison and Mr. J. L. Towers, Assistant Traffic Engineer, Illinois Division of Highways.

The Executive Committee and those attending the Conference expressed themselves as highly pleased with the attendance and results of the Conference, and stated that they believed it had more than accomplished its purpose, which was to "Provide a comprehensive review of the latest traffic engineering techniques and results, permit the exchange of ideas and methods, and aid engineers interested in traffic engineering to become acquainted with each other and with national leaders in the traffic engineering field."

The Executive Committee pointed out that a number of inquiries have already been received from other states regarding how best to promote similar Conferences, and expressed the belief that the Illinois Conference will be only the first of many similar conferences.

Institute of Traffic Engineers To Sponsor Session at the Greater New York Safety Conference

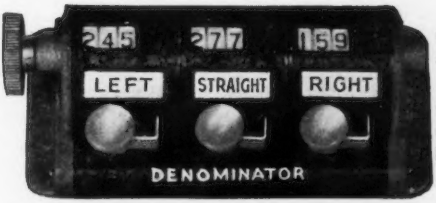
The following members of the I.T.E. will present the 1941 I.T.E. Session of the Greater New York Safety Conference.

"STREAMLINING OUR EXISTING STREETS AND HIGHWAYS"

A Session of the 1941 Greater New York Safety Conference Sponsored by

TRAFFIC COUNTING SIMPLIFIED WITH
NEW TRAFFIC COUNT DENOMINATOR

Illustration of 3 unit Counter, classifying directions of travel



Other models with from 1 to 12 classified counting units mounted in horizontal line.

By simply pressing key one count is recorded in classified counting unit controlled by that key.
•
Touch method employed permitting operator to keep eyes on road at all times.
•
Quick reset returns all counting units to zero.
•
Counting units may be classified to represent direction of travel, different types of vehicles, state license plates, and other important classifications in traffic planning.
•
Now in use by City, County and State Highway Departments throughout the U.S.A.
•
Quick . . . Accurate . . . Efficient.

— WRITE FOR CATALOGUE —

THE DENOMINATOR CO., Inc. - 261 Broadway, N. Y. City

the Institute of Traffic Engineers, Wednesday Afternoon, April 23, 1941, at 2:00 P.M.

Chairman: Hawley S. Simpson, Research Engineer, American Transit Association, New York, N. Y., President, Institute of Traffic Engineers.

1. "WARRANTS FOR ONE-WAY STREETS AND THEIR VALUES"

Speaker: Dwight M. McCracken, Director, Traffic and Safety Bureau, Liberty Mutual Insurance Company, Boston, Mass.

Discussion: Wallace L. Braun, Traffic Engineer, Police Department, Baltimore, Md.

Robert A. Mitchell, Traffic Engineer, Dept. of Public Safety, Philadelphia, Pa.

A frank, open discussion of one-way streets—the whens, wheres, whys and hows—as a means of facilitating traffic movement in urban areas.

2. "RECENT INNOVATIONS IN TRAFFIC SIGNING"

Speaker: Wilbur S. Smith, Traffic Engineer, So. Carolina State Highway Department, Columbia, So. Carolina (On leave); Research Assistant, Bureau for Street Traffic Research, Yale University, New Haven, Conn.

Discussion: Sidney M. Shapiro, Asst. Chief Engineer, Long Island State Park Commission, Babylon, New York.

Frederick C. Tarbox, Asst. Traffic Engineer, Division of Traffic and Safety, Ohio Department of Highways, Columbus, Ohio.

A discussion of new developments in the design and application of regulatory and guide signs as controls and aids to vehicular traffic in and around urban areas and on state highways.

3. "STREAMLINING CONNECTICUT'S INTERSECTIONS"

Speaker: E. W. Osterhoudt, Division of Highway Control, Connecticut State Highway Department, Hartford, Conn.

Discussion: Mr. A. L. Kalas, District Maintenance Supervisor, Connecticut State Highway Department, Hartford, Conn.

Theodore M. Matson, Research Assistant, Bureau for Street Traffic Research, Yale University, New Haven, Conn.

A discussion of principles involved, and the methods used, in the reconstruction of urban and rural intersections throughout Connecticut for the relief of congestion and the reduction of accidents.

This session was prepared by Merwyn A. Kraft, Accident Prevention Engineer, American Transit Association, at the request of President Simpson and the Greater New York Safety Council.

Reports and Publications

Bicycle Safety. The final report of the National Safety Council's Committee on Bicycle Problems. The report presents the finding and recommendations of the committee after two and a half years of study. Material presented in last year's report has been brought up to date and fully summarized. Suggestions for state, municipal, school and home bicycle safety activities are made. Modern legislation for home, school and municipalities are contained in the appendices.

A Comprehensive Plan of Motorways for Detroit. This report, published by the Michigan State Highway Department, of which G. Donald Kennedy is the Commissioner, is the result of careful studies of the traffic and traffic vehicles in and around Detroit. The studies were made by the Michigan State Highway Department and are presented in a seventeen-page, illustrated and colored brochure. Such subjects as "The 1925 Master Plan for

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Selected on basis of brilliancy and permanent reflection

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CATAPHOTE REFLECTOR BUTTONS FULFILL ALL ENGINEERING PRINCIPLES OF REFLECTIVITY

PERMANENT REFLECTION

Pure Aluminum FUSED to optical glass lens eliminates air space

- NO MOISTURE CONDENSES
- NO TARNISHED REFLECTORS
- NO YELLOWING WITH AGE

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WESTERN CATAPHOTE CORPORATION - Toledo, Ohio

the City of Detroit" has been covered and the study of the purposes and types of motorways, the routing of motorways, and the bases for motorway planning has been encouraged.

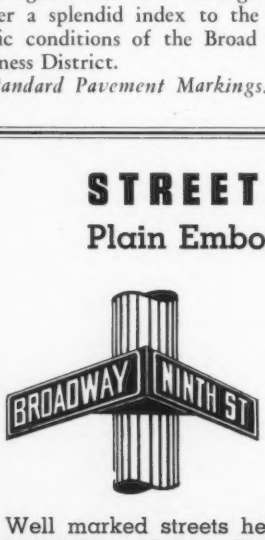
A Study of Street Traffic Conditions, Broad Street Business District, City of Elizabeth, New Jersey. This report, prepared by Merwyn A. Kraft (Affil. I.T.E.), Accident Prevention Engineer of the American Transit Association, was compiled for the Elizabeth, New Jersey, Safety Council and the Chamber of Commerce of that city. This fifty-page report covers the fundamental principles in street traffic control, the present street traffic conditions and gives a recommended street traffic control plan for Elizabeth, New Jersey. The report is nicely illustrated with figures and tables and gives the reader a splendid index to the street traffic conditions of the Broad Street Business District.

Standard Pavement Markings. Prepared by the Division of Traffic & Safety of the Ohio Department of Highways of which Harry E. Neal (Mem. I.T.E.) is Chief Traffic Engineer and Fred C. Tarbox (Jun. I.T.E.) is Assistant Traffic Engineer. This manual, dealing with the design, application, and location of various pavement markings is devoted primarily to charts and diagrams that are clearly and intelligently presented. The general considerations, the paint, the field procedures, and also the care and cleaning of equipment are covered adequately.

Licensed Drivers by Age, Sex and State. This is a research report prepared by the Safety & Traffic Engineering Department of the American Automobile Association of which Burton W. Marsh (Mem. I.T.E.) is Director. This mimeographed report shows in details an analysis and interpretation of traffic accidents related to licensed drivers by age, sex and state. Charts

STREET NAME SIGNS

Plain Embossed or Reflectorized



We have a simple, efficient plan for your new suburban as well as your urban areas.

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Finished in Baked Enamel
Economical - Durable - Attractive

Well marked streets help to build your city. Send us your list of Street Names. We'll quote promptly.

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Traffic Signs for Every Purpose

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and figures indicate the conclusions drawn by the research group that made this study.

Biennial Report of the Commissioner of Motor Vehicles. This report for the Motor Vehicle Department, State of Connecticut was presented by Michael A. Connor, Commissioner of Motor Vehicles and deals with the fiscal periods, July 1, 1938 to June 30, 1940. This forty-nine-page report indicates by charts and statistics the recommendations of the Commissioner for changes in motor vehicle laws, a report as to revenues received, and expended, and a court record of motor vehicle convictions. It has also incorporated therein the State Traffic Commission's report.

First Annual Report, Traffic and Safety Division, Michigan State Highway Department. This report is presented by D. Grant Mickle (Mem. I.T.E.) former Consulting Traffic and Safety Engineer, and A. F. Malo, Acting Traffic and Safety Engineer for the Traffic and Safety Division of the Michigan State Highway Department. This fifty-two-page report marks the completion of the first year of operation of the newly created Traffic and Safety Division and reviews the method of operations and accomplishments during the period of September 1, 1939 through August 31, 1940. The Organization Division is clearly defined in the organization charts and the responsibilities are briefly outlined under the heading "Functions and Duties of the Division." There is also included a brief summary of the training and experience of the personnel. The accomplishments of the division are divided into sub-divisions of the work carried on by the various branches, such as "Signals," "Sign and Markings," "Statistical Analysis and Designs." This report is beautifully illustrated with photographs and charts.

A Study of Traffic Courts and Prosecutors. Received from Arthur T. Vanderbilt, Chairman of the National Committee on Traffic Enforcement of the American Bar Association. This report, the result of over two years of intensive research, deals with the different types of Courts in which traffic violators are brought for trial, including Justices of the Peace. The report contains fifty-seven specific recommendations which deal with Laws, Court, Procedure, Personnel, and Administration.

Looking Ahead

Apr. 1-3, Pittsburgh, Penna.: Western Penna. Safety Council, 17th Annual Regional Safety Engineering Conference, E. J. Kreh, secretary, 704 Empire Bldg., Pittsburgh, Pa.

Apr. 2-3, Newark, N. J.: Seventeenth Annual Eastern Safety Conference. Fred M. Rossland, secretary-manager, Newark Safety Council, 24 Branford Place, Newark, N. J.

Apr. 15-17, Columbus, Ohio: All Ohio Safety Congress (Neil House). Thomas P. Kearns, superintendent, Division of Safety and Hygiene, Industrial Commission of Ohio, Columbus.

Apr. 22-25, New York City: Greater New York Safety Council, Twelfth Annual Convention and Exhibition. (Hotel Pennsylvania.) Greater New York Safety Council, Inc., 60 East 42nd Street, New York, N. Y.

May 6-8, Chicago, Ill.: Midwest Safety Conference. (Hotel Sherman.) Geo. G. Traver, manager, Greater Chicago Safety Council, 222 North Bank Drive, Chicago, Ill.

May 22-24, Norfolk, Va.: Seventh Annual Va. State-wide Safety Conference. (Monticello Hotel.) Wm. M. Meyers, executive secretary, Richmond Safety Council, 30 Allison Bldg., Richmond, Va.

August 18-21, Buffalo, N. Y.; International Association of Chiefs of Police. William P. Rutledge, 3131 E. 60th St., Chicago, Ill.

Quaint Traffic Control Laws Get Results in Other Lands

While American communities are wrestling with traffic problems which are becoming increasingly more serious, it is of interest to consider some of the methods, quaint but effective, adopted by other countries to combat traffic law violations.

In *Panama*, for instance, they pride themselves on politeness, no gruff traffic cops, no angry threats, no shrill sirens. Of course, there aren't so many roads, so the problem is simplified. Authorities have marked off the entire 360-mile stretch of the Pan-American highway into 20 and 30-mile strips and set up a control booth in each section.

Every driver who comes into the highway stops at the nearest control booth where he receives a slip stamped with the name of the control station and the time he left it. A second stamp tells when the driver is expected to reach the next station. If he gets there too soon he's arrested for speeding, and incarceration in a Panama jail is said to be a sure cure for the worst speeder.

In *Bombay, India*, authorities issued an order permitting unrestricted use of headlights at night and it is claimed that a reduction in the number of collisions and accidents has resulted.

In Jugoslavia, and some other European countries, when policemen capture a speeder there are no accusing words or bickering over a ticket. Officers simply let the air out of all tires, tip their hats and go on their way. The driver's session with a tire pump which follows is a lesson which he doesn't forget in a hurry.

Of course, speeding isn't the only problem. Take *Buenos Aires*, for instance. The Latins are a volatile race and the confusion and noise in heavy traffic is terrible. Drivers too usually find something to distract their attention when stopped for a red light. So the officials installed a siren at an important intersection to warn drivers when the signal was about to change.

In *Rome* horn blowing is prohibited at night.

Position in Los Angeles Available

The Los Angeles City Civil Service Commission announces an examination for a Traffic Control Analyst to fill the vacancy now existing in the Street Traffic Engineering Bureau of that city. The head of this Bureau is a Traffic Engineer. There are two Traffic Control Analysts immediately under him. The Bureau has complete charge of all street painting, signs, and signals within the city. The salary to begin with is $175.00 per month. Energetic, competent, and well-trained men in the field will find the job an excellent beginning and should make contact with the Institute of Traffic Engineers for further information.

Dual Use of Street Sign Posts Saves Money for Flint

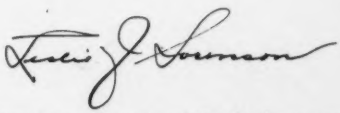
By placing street name signs above stop signs on the same sign posts at street intersections, Flint, Mich., is saving money by using a smaller number of sign posts in its program to completely mark intersections along arterial highways within the city. The city is erecting 1,500 street sign units as part of a PWA project. Unpainted sapgum wood plates with raised letters are used for street name signs. The plates are one inch in thickness, five inches in width, and of sufficient length to carry the necessary lettering which is 3¾ inches in height with a three-quarter inch stroke. Black paint is used for the background and white paint for the face of the letters

Efficiency and the Traffic Engineer

CREDIT sides of the ledgers are never imposing, no matter how large the income, unless the debit pages show a substantial lesser amount. Mere construction of new street and highway facilities will never eliminate the traffic congestion and accident problems unless the design meets modern requirements and the use of all facilities are so regulated that something approaching maximum efficiency is obtained. A business that operates without profit seeks the services of an efficiency engineer to ferret out mismanagement and locate items of waste or extravagance and, in addition, to generally advise on ways and means to produce a balance sheet written with black ink.

The biggest business in the world is the operation of the communication and transportation system over public thorofares. This business is conducted under a far-flung and widely divergent system of district managers represented by States, Cities, Counties, Townships and Authorities. In some sections management is poor and inefficiency of utility is reflected by accidents, traffic confusion and congestion. Here, as in any other failing business, is the need for the efficiency expert and there is such an expert in the person of the Traffic Engineer. He has demonstrated time and again that increased returns on the taxpayer's investment can be obtained through the application of engineering methods to the regulation and control of traffic. He has proven that traffic fatalities, injuries and property damage can be reduced through the application of engineering technique. He has saved countless sums in new investments through knowledge on traffic information.

How long must taxpayers and users wait before all government managers of highway transportation systems adopt modern methods in the operation and construction of the properties to assure to the owners the greatest return on their investments?



Past Pres., Institute of Traffic Engineers

HOW WILL NATIONAL DEFENSE AFFECT HIGHWAY TRAVEL

By C. E. Fritts

THE ambitious title of this article may for the moment deceive a naive reader into assuming that a prophet has risen in our ranks. However, if there be such a reader, he shall soon be undeceived. What he will have to content himself with is a listing of certain developments already in evidence and some speculation along very "iffy" (to paraphrase Mr. Roosevelt) lines.

It is easy, of course, to mention at the outset that the mobilization of our man power will certainly produce at least local effects. Concentrating a million and a quarter men in a relatively few areas means the creation of new cities overnight. These cities generate traffic within themselves and also attract traffic in the form of trucks bringing supplies, cars bringing visitors, sightseers, etc. For instance, in the State of Washington, traffic on U.S. 99 between Tacoma and the twin encampments of Camp Murray and Fort Lewis increased from about 6,000 cars per day to an average of about 15,000 cars per day as a result of activities involved in constructing a new cantonment and the arrival of 17,000 new troops. Side roads which carried fewer than 50 cars per day now have an average daily volume greater than 2,000 cars. Peak traffic on U.S. 99 has increased from about 600 cars per hour to 2,500.

Every traffic engineer can visualize for himself the demand for facilities these increases in traffic resulting from troop concentrations present. Grade separations, traffic signals, special left-turn lanes, even new roadways, among many other things, are required, and not a year or months from now but *NOW*. Multiply this a hundredfold or perhaps a thousandfold, including the problems presented by naval bases, air bases, etc., and you have a large-scale picture of this phase of National Defense.

Then consider the effects of new housing projects for defense workers, of mammoth factories springing up in weeks, employing thousands of workers most of whom come in cars. For instance, in Bremerton, Washington, one of the Navy's great shipbuilding and repairing yards, a housing project of more than 2,000 units is under construction along a highway which is already loaded far beyond its capacity by existing traffic. The problem here is of a major character. Boeing Aircraft Corporation on U.S. 99 at the south limits of Seattle, with 18,000 workmen, adds 9,000 cars or 18,000 trips to a highway which normally carries 16,000 cars per day; and not only must facilities for movement be supplied, but storage space for the cars of the workmen while inside the factory as well.

There is activity in every corner of the land. Unemployment rolls are decreasing by millions. Government economists predict that the national income for 1941 will exceed in actual dollars the 83 million mark set in fabulous 1929 and will greatly exceed it in buying power. As more money becomes available, more cars come into use and more miles are traveled. Where automobile travel is concerned, this increase is proportionately greater than the actual accretion in income. For instance, with a national income of 60

million dollars, 7.6 per cent of it is spent on automobile travel, but with an income of 80 million dollars this will increase to 8.6 per cent.

What we can expect then is a national increase in travel during 1941 of perhaps 15 per cent, with enormous traffic increases occurring in certain areas where defense industries or activities are concentrated. City streets in our opinion probably will suffer greatest, because much of our defense activity is essentially urban and because of their inadequacy for even present traffic. One thing is certain—the traffic engineer will be busy.

Before closing, we should say that all of our assumptions presuppose a continuance of the status quo which is a most insecure foundation for a too elaborate structure. Nevertheless, only an early British victory can put an end to our defense efforts and this seems too much to hope for. A German victory would probably only increase our activities. On the other hand, there is a possibility if we became an actual belligerent in the war that some restriction might be placed upon the use of gasoline or that fewer cars might be produced in order that manufacturing facilities might be concentrated upon tanks, etc. But this latter possibility might not affect travel very much because of the reserve of used cars which might be driven farther and longer as happened during the last depression. Gasoline rationing, except in aviation fuel seems hardly probable either in view of our enormous resources.

A more probable brake upon travel increases might come if 3 or 4 million young men were withdrawn from civil pursuits into our armed forces. This effect would, of course, be to some extent nullified as men and women were withdrawn from the relief rolls to replace them, although it could not be expected that their travel miles would be equal to those of the young, vigorous men they would replace. This reduction might also be minimized further by an increase in purely military travel, depending upon the theater of our military activities.

In any event, however great the problem may become, there is no denying the present emergency. In all likelihood the traffic engineer has never been confronted with a more challenging demand for all the knowledge and ingenuity he can bring to bear.

An original article by C. E. Fritts (Assoc. ITE.), Traffic Engineer, State of Washington.

ADDING LIFE TO OUR LIFE LINES

By BERNARD C. HARTUNG

ONE day in late June of last year, the maintenance engineer, traffic engineer, and other officials from the headquarters office of the Nevada State Highway Department stood on a certain section of highway between Reno and Sparks and congratulated themselves on the very fine appearance of the center line and lane line treatment that had been applied in that region. Because of adequate existing width, the highway had been converted from a two-lane to a four-lane thoroughfare thus making it possible to handle a heavy load of daily vehicular traffic in an improved and satisfactory manner. Three days later, certain of these men again observed the treatment and were surprised to perceive that the lines had been dulled to a measurable extent, i.e., they were rapidly losing their value from a visibility standpoint.

The average maintenance or traffic

engineer realizes that an investment of this nature, $50 to $75 per mile on a four-lane route, is something to think about and to have the lines lose their maximum worth in such a short period of time is quite discouraging. However, we quickly concluded that it was hardly possible for these lines to wear out in seventy-two hours and immediately set about finding out why the stripes were becoming so readily obliterated. The answer was rather startlingly simple — traffic scum or common everyday oil and dirt were found to be the chief cause of our trouble.

On a heavily travelled route, particularly in the vicinity of municipalities, this condition referred to above, i.e., excessive wear of traffic lines and lane lines, is much more apparent than on the open highway. These thoroughfares are subject to heavy daily volumes of traffic, including trucks of all sizes, and, naturally, there is a much higher percentage of what might be termed destructive use of the lines.

On the treatment referred to above, the Nevada Department of Highways planned their operations as carefully as possible. By starting work around 4:00 A.M., thus avoiding peak loads of traffic, we were able to get our pilot lines and the finished stripes in place in an actual working period of about four days. This particular stretch of roadway is three miles in length and, as indicated previously, required the application of a continuous center line plus yellow barrier stripes down the entire middle section. On either side of this, two lane lines were placed to accommodate the traffic moving in both an easterly and westerly direction; seven lines in all.

When the stripes began to fade and a rather heavy investment seemed jeopardized, we concluded that something must be done, and done promptly, to combat the aforementioned scum and dirt. The result of this determination to properly care for these lines is our present line washing machine constructed on the principle of speedy and efficient operation. The shops of Reno provided the necessary materials and machinists and it required a period of about one month to work out the details of the unit itself. The results were most encouraging and, above all, substantiated the investment in the unit.

Briefly, the machine is a two-wheel pusher type powered by a two-cylinder, air-cooled 4 h.p. motor. A fourteen inch circular brush mounted on ball bearings and attached to a sixteen inch plate actually does the scrubbing job. The washing solution is fed to a vertical shaft and subsequently to the brush by gravity from a supply tank on the truck. The latter serves as the motivating unit for the washing machine and, as indicated, carries the water tank and other necessary supplies. The pump forces water through a nozzle mounted behind the brush (forty lbs. pressure) which serves as a rinsing solution on the line itself. This operation eliminates all abrasives or harmful cleaning ingredients from the painted surface.

Our washing unit is attached to the truck with two movable arms linked to brackets on the bumper. These arms are eight inches long and are connected with lever and rods to an adjusting device which is used to regulate the pressure of the brush on the road surface and also to lift it clear of the roadway. The rubber wheels on the unit are of the caster type mounted towards the front of the frame. This latter feature enables the machine to be steered and controlled by the individual operating the truck.

An original article by Bernard C. Hartung (Jun. ITE), Director, Division of Traffic and Safety, State of Nevada.

METHODS OF OBTAINING AND ANALYZING REPORTS OF ACCIDENTS ON HIGHWAYS OUTSIDE OF MUNICIPALITIES AND THEIR APPLICATION TO THE WORK OF A HIGHWAY DEPARTMENT

By ARNOLD H. VEY

THE basic source of accident records is a report on a standard form from the motorist or motorists involved in an accident. In New Jersey, for example, every motorist involved in an accident resulting in death, injury or property damage to the extent of $25.00 or more, is required to report to the Commissioner of Motor Vehicles, on a standard report form supplied by the department, within forty-eight hours after the accident.

To insure more or less complete reporting and to enable a more accurate determination of the details of the accident and the cause, the Commissioner of Motor Vehicles has, through the support of appropriate legislation, requested all police authorities of New Jersey to report to him accidents which they have investigated or which have been reported to them, regardless of whether the motorists involved have reported.

It is quite human for motorists involved in an accident to lighten their own responsibilities by claiming in the report that the "other fellow" failed to observe one or more of the rules of the road and therefore was to blame for the accident. Many times, too, motorists involved in an accident which has been investigated or reported to the local police, feel that their legal responsibility has ended and it is no longer necessary for them to report to the Commissioner of Motor Vehicles. The independent police report is therefore most important.

To further insure complete and accurate reporting, it is essential that the accident report filed by the motorist be not open to public inspection. The New Jersey law requiring compulsory reporting reads in part as follows:

> . . . "The report shall be made without prejudice, shall be for the information of the department, and shall not be open to public inspection. The fact that the reports have been so made shall be admissible in evidence solely to prove a compliance with this section, but no report or any part thereof or statement contained therein shall be admissible in evidence for any other purpose in a proceeding or action arising out of the accident." . . .

In the case of fatal accidents, additional reports from county medical examiners, coroners and prosecutors as well as a re-check with the State Department of Vital Statistics, will insure a 100 per cent accurate record of accidents in this category.

There is no essential difference in accident reporting within or outside urban areas, with the exception of possibly in urban areas, because of the frequency of street intersections and other landmarks, the exact location of the accident can be more definitely described in the report.

In the rural areas with long stretches of undeveloped property contiguous to the highway and more or less infrequent cross roadways, an accurate description of the scene of the accident becomes more difficult. Adequate investigation and reporting on the part of enforcement agencies in filing the police report will offset this difficulty. However, in rural areas, police are many times not available and it is the belief of the writer, therefore, that the establishment of a uniform and standard method of numbering rural highways by section numbers and dis-

playing such identification in a manner to be readily discernible, will prove most helpful to traffic authorities in determining accurate locations of accident happenings.

That such a standard method of section numbering and displaying such numbers along highway routes, particularly in rural areas, will not alone be satisfactory to all highway and traffic authorities but also easily adaptable in all states, it is suggested that a project committee be appointed to study and report upon such a system.

As previously stated, accident records too complicated and, on a statewide basis, too numerous for the mind to grasp all of the pertinent facts and necessary details without scientific analysis. It is necessary, therefore, that periodically, for example once each month, a summary analysis be made of the previous month's accidents.

In addition to the state-wide summary analysis, special analyses may be important and necessary for certain types of accidents or for specific political jurisdictions within a state such as a summary for each county or for the larger municipalities of the state. The amount of personnel assigned to accident analyses will more or less dictate the extent to which special and detailed summaries can be made.

Following the compilation of the monthly summary and other immediate studies, the accident report cards should be filed for future reference and special studies. To enable ready reference, it is required that the reports be filed by location and separated by years. It is advantageous that the location file be separated into accidents occurring on the state highway system and those occurring on roadways other than state highways. In each case, it is desirable that the files be sub-divided—primary by counties and secondary by municipalities—and, if necessary, reports of intersection accidents can be further broken down alphabetically by street names. Reports of accidents occurring between intersections are filed by location through the use of appropriate intersection tabs or mid-block identification.

Although state highway departments may not be concerned with traffic law enforcement or educational activities, it might be of interest to know some of the uses that such agencies make of accident records.

Briefly, it is most proper to apply effective enforcement at locations where it will do the greatest good such as at the high accident frequency points. Selective enforcement, therefore, required careful planning and can only be properly planned through a complete analysis of accident records. Through proper recording and analysis of accidents, the type and amount of enforcement can also be related to the extent of the problem and measured by means of the enforcement index. Accident records can further serve as an aid to magistrates in meting out reasonable and adequate punishment.

Good accident reporting and analysis make possible proper planning of a street and highway educational program—one that will not only bring about a consciousness of the seriousness of the accident problem on the part of highway users but also a whole-hearted recognition of individual responsibility in the problem. Educational effort must not only be appealing and attractive but conclusively prove to the individual that it is smart economically and otherwise to become a safe highway user. Only through a complete and accurate analysis of accident facts can this be accomplished.

The engineering use of accident records is of considerable value and most important to highway departments; first, in determining the accident-prone locations on the state highway system; second, in determining

the proper corrective to be applied at such locations; third, in determining the effectiveness of traffic control methods; fourth, in determining the adequacy of existing roadway systems and the need for improvement in roadway design and, fifth, in conducting necessary research in the causes and prevention of accidents.

One of the best methods of establishing a visual display of accident frequency of a locality and one that enables a ready determination of the density of accidents at various locations, is the accident spot map. As the number of spots increases, the heavy accident locations appear, consequently directing attention of traffic authorities to such "worst" locations.

There are many types of spot maps which may be put into use; however, it is important that a single spot map be not complicated by too many classifications and the spot map for general use should probably be classified into not more than three types of accidents; that is, WITH PEDESTRIAN, WITH OTHER MOTOR VEHICLE and the MISCELLANEOUS GROUP, all segregated by severity—fatal and non-fatal.

After determining the worst locations (whether they be at or between intersections), the next step is a thorough study of the accident reports taken from the location file for those locations.

A convenient and useful method for such a study is the collision diagram method—one by which accidents are diagrammed in a way to answer question such as these:

What is the extent and seriousness of the accidents?

Do they occur during hours of daylight or darkness?

Are they of the right angle collision type, head-on, rear-end, pedestrian or fixed object?

Is there a predominant direction of travel of vehicles involved in accidents?

These are but a few of the clues developed by means of the collision diagram. Correlating the accident study with field studies of traffic and physical conditions will, to the trained authority, point the way to a solution.

The correctives which may be applied at high accident locations are many and vary in degree. It is readily possible, therefore, for anyone, even those who are responsible for the regulation and control of traffic, to guess wrong without the guidance of accident records.

There are many examples of wrong guesses — guesses based upon opinion and not fact. It will suffice here to mention only a few.

Arbitrary and promiscuous installation of traffic control regulatory devices is an example which has not only been true in the past but is still popular in some localities. In the case of traffic control signals, independent surveys made several years ago prove conclusively that contrary to popular belief, signals unwisely installed and operated may directly or indirectly cause an increase in accidents rather than a decrease. Traffic control signals will perform highly useful functions both in the manner of properly regulating traffic as well as reducing accidents, when they are installed at intersections where their need is warranted and when properly operated.

The establishment of arbitrary speed limits based upon opinion rather than scientific investigation is also an example of poor guesswork. Studies made throughout the country definitely determine that speed limits arbitrarily established generally result in wholesale disregard of such limits and have little effect on accident reduction, particularly when the maximum speeds established are unreasonably low.

In the field of highway design, transportation facilities are too often planned and constructed without proper analysis of accident experience. The mistakes of the past are continued

with little regard for the accidents which might be caused directly or indirectly through such errors. It is of especial importance, therefore, that all highway departments make use of accident data to provide a factual engineering approach to the highway problem.

Checking results of applied correctives for high accident locations is necessary to determine the value and usefulness of methods of traffic control, both of the applied and built-in type. Adequate "before and after" studies answer the question "was there a reduction in accidents after the application of the corrective?"

An illustration of the value of "before and after" studies, both from the standpoint of good engineering as well as good public relations, is shown in the "before and after" studies of accident experience along sections of New Jersey's state highway system recently converted into divided highways. A "before and after" study of accident experience on a ten-mile section of a roadway converted from a four-lane undivided to a four-lane divided highway, comparing accident experience two years before and two years after the conversion, shows a reduction of more than 83 per cent in fatal accidents, more than 48 per cent in injury accidents and more than 40 per cent in total accidents. Balancing the cost of the conversion with the economic saving resulting from accident reduction, it is determined that the saving in accident costs will equal the cost of construction plus interest charges in slightly more than three years.

If monies for street and highway improvements are to be properly and adequately allocated to the roadway system of the state, resulting in traffic expedition with safety and applied in order of priority where the needs are most apparent, it is essential that extended research be made of accident data.

It is the opinion of the writer that highway departments are many times engaged in a construction or re-construction program where the expenditure for eliminating one type of hazard is far out of line with the needs when compared with another type of hazard. For example, in most states considerable monies have been spent in the past for rural railroad grade separation but little monies have been spent for proper and adequate rural pedestrian protection, despite the fact that the frequency of rural pedestrian accidents far exceeds that of railroad grade crossing accidents. It is realized, of course, that many factors enter into such a problem. However, there is an indicated need for definite and complete studies of accident records prior to the allocation of funds to insure the expenditure of monies where the greatest good will be accomplished.

A correlation of the traffic and highway data now being gathered by the planning surveys carried on in the states, which accident experience, will not only aid in determining a proper allocation of highway monies but will supply the basic data necessary to relate accident experience for a given highway with the physical and traffic conditions of such a highway.

Through such research study, accident expectancy based upon traffic volume and physical conditions of a highway will be developed which will enable the engineer to predict the number of accidents on a given road having a known traffic volume and physical rating. Such data will further enable the engineer to determine the expected reduction in accidents, following a change in physical conditions, thereby making possible a determination of the economic justification for the removal or correction of such physical conditions.

Traffic accident research is proving from the standpoint of accident reduction the value of not only applied

regulatory devices but also physical methods of traffic control obtained through highway design. There are, however, many details of design which are still controversial and require further study.

In the case of divided highways, accident research in New Jersey as well as elsewhere has definitely proven the value of segregating opposing flows of traffic on highways four or more lanes in width. There is need, however, for continued research to prove the relative value of center islands of varying widths and whether in the case of a four-lane surface roadway of insufficient right of way, with frequent grade intersections, a narrow two-foot island is of value from an accident reduction standpoint over no island at all. Continued accident research is necessary to also more definitely determine the minimum frequency of island openings in center islands and the maximum width of island openings.

Traffic circles and grade separations have proven their worth from the standpoint of accident reduction. However, there are questions of detailed design which are still controversial such as, for example, the maximum width of rotary roadway necessary to provide easy movement with minimum hazard. Further accident research will aid in obtaining the correct answer to this question.

The application of channelizing islands at complicated and wide-throat grade intersections results in accident reduction through controlling the direction of traffic flow, converting opposing conflicts to right-angle or near right-angle conflicts and supervising merging movements. Traffic accident research will further prove the value of channelization and throw more light on questions of design and application of such islands.

The construction of "freeways," (roadways upon which all possible conflicting and interfering flows of traffic have been eliminated through physical separation or segregation) in heavily congested metropolitan areas, will give to the traffic authorities opportunity to prove factually the merits of roadways of this type from an accident reduction standpoint. Preliminary studies tend to support the contention of early estimates that through proper and adequate highway design, accident rates can be reduced 50% to 75% or more. More complete and detailed research is necessary, however, and it is hoped that upon completion of the planning surveys, the required data will be available to enable such an analysis.

The matter of lane width is a subject about which there is some controversy. During the past several years, a ten-foot traffic lane was considered sufficiently wide. However, with increased design speed of automobiles and highways, some highway and traffic authorities believe lane width should be increased to eleven feet, while others contend that a twelve-foot or wider lane is necessary along present-day high-speed roadways. Traffic accident research would serve as a guide to the answer to this question.

At the present time, too, there is considerable difference of opinion among highway and traffic authorities as to the proper number of lanes for traffic traveling in the same direction without segregation. Some contend that on a multiple-lane highway, where there are more than two lanes in one direction, segregation should be provided, while others believe that it is unnecessary to segregate traffic in the same direction, regardless of the width of the travelable roadway.

There are, too, other questions of highway design which are sorely in need of traffic accident research to aid in their solution. These would include design of grade intersections—particularly the "T" type vs. the "Y" type

of intersection; shoulder stability is another item of controversy; the value of adequate sight distance along high-speed roadways, both on vertical and horizontal curves, is also a subject of controversy among highway and traffic officials.

Cooperative traffic accident research studies among the member states of these as well as other items of importance, would not alone be timely but would in many instances supply the answers to problems which at present go unanswered or receive answers based upon opinion and wishful thinking rather than sound facts.

In conclusion, it is essential that accident analysis be requisite to highway planning and construction. Motor vehicle accident reports make available the facts and data necessary to insure application of proper treatment, without which it is a matter of chance whether the treatment applied will correct the hazard.

There is not only need for greater and more extensive use of accident facts in determining design and construction policies but also need for more extensive and detailed reporting to insure accurate information.

Accident facts further will aid in proper allocation of highway monies to guarantee the greatest good from monies spent.

Continued research in accident data will further reveal the relationship between highway design and construction, and accidents, pointing the way to the application of proper and adequate highway safeguards which will decrease the importance of the driver (human element) factor, thereby making it less possible for highway users to perform improper practices causing accidents.

Condensed from an address by Arnold H. Vey (Mem. I.T.E.), Traffic Engineer, Motor Vehicle Department, State of New Jersey, presented before the Association of State Highway Officials of the North Atlantic States.

THE ADMINISTRATION OF STATE TRAFFIC ENGINEERING DEPARTMENTS

By MAXWELL HALSEY

Editor's note: This is Part II of a two-part article dealing with the administration of state traffic engineering departments. Part I was offered in the March issue of TRAFFIC ENGINEERING. In order to get a complete picture of how to run the traffic engineering factory, may we suggest that the reader read both Part I and Part II.

IF the traffic engineer is to get credit for his accomplishments, he must make detailed records, make before and after studies to prove the benefits of his actions and reduce these to monthly, annual and special reports. These reports should contain such items as:

(1) Reduction in accidents — before and after cases.
(2) Reduction in delay—before and after cases.
(3) Number of signs installed, replaced, repaired.
(4) Miles of paint lines painted.
(5) Number of signals installed, replaced, repaired, retimed.
(6) Number of islands installed.
(7) Number of intersections channelized.
(8) Number of intersections redesigned.
(9) Number of new intersections and roadways designed.
(10) Number and types of surveys made.
(11) Number of complaints and requests investigated.
(12) Number of public contacts, speeches, articles, fair exhibits, etc.
(13) Increase or decrease in traffic flow.
(14) Budgetary statement.
(15) Office studies completed.
(16) Legislation or regulations proposed.
(17) Personnel activities, honors, promotions, advances, training, etc.
(18) Municipal cooperative activities.
(19) Budget expediture and justification.

The form of the report is exceedingly important. It will depend upon

who is expected to read it. If this report is to be read by people not in the traffic field or by citizens or members of the legislature who are very busy, then it should be generously illustrated with pictures and other methods of attractive presentation and should approximate the form of highly illustrated magazines—otherwise it never may be read due to lack of time and interest. If it is to be read by executives, it should have the summary and recommendations in front, followed by a concise statement of what has been done and all supporting data in the appendix—otherwise it may not be read due to pressure for time. The report is an excellent way to get around writing ten dollar letters answering requests for information. In many cases, the material in the printed or mimeographed report will represent the only available copies of the material. The report should be considered as a sales document and it is well worth the money to secure enough copies to be sent wherever they will be effective. The appearance of the report should be such that the division may be proud of it. It should be emphasized that the report is not written for the traffic engineer, but for others and that their background and positions should control its presentation.

Staff Meetings: The eighth process is that of staff meetings. It is axiomatic that no organization can be administered efficiently unless the key men are called together about once a week to discuss problems, report progress, adjust the program and make plans. Meetings of this kind give the personnel a feeling of being an important part of the organization, rather than merely an employee taking orders from the boss. Occasionally, at predetermined intervals, the district men and even the detailed workers should be included. If there is any serious difference of opinion or dissatisfaction on the part of any employee concerning the work, it is far better to encourage him to get it off his chest at such a meeting than to give him no outlet.

Staff Credit: It is exceedingly important that the heads of traffic engineering divisions give adequate personal and professional credit to their assistants. They should build up these men as future administrators. They should be encouraged to take part in all professional activities, such as serving on committees and preparing articles. The giving of credit by the "boss' always enhances his standing.

Training: The ninth process is in the in-service training of all employees. If they are not encouraged and given a chance to learn, they will grow very slowly and may never reach their potential ability. A program to accomplish this should include a traffic library, monthly bulletins on new traffic developments, a week's traffic course run by the department with assistance of outside guest lecturers, sending men to short courses and graduate courses in traffic engineering.

Work Schedules: The tenth administrative tool is the work chart or schedule. The simple pressure of routine work makes it difficult to plan. Unless all routine work and assignments are scheduled and charted, the work will never be kept up to date and no time can be salvaged for planning, research, or the development of better methods. Definite deadlines should always be set, even though they may frequently have to be adjusted.

Basic Plans: The eleventh process is the development of a basic plan for the year and the selection of what can be accomplished in that time with the manpower and funds available and which activities should be given priority. This applies chiefly to mechanical control and design. Sound planning represents the most difficult administrative process and in actual practice its technique lags behind almost all

other processes. The following are some of the elements which should be considered in making up a year's plan:

(1) Locations having the most accidents and/or congestion.
(2) Amount of funds and manpower available.
(3) Season of the year and the weather.
(4) Those activities having a high public relations value.
(5) Projection or completion of large scale projects.
(6) Complaints and pressure—other things being equal.
(7) New construction to guarantee adequate performance.
(8) Times of political pressure — other things being equal.
(9) Locations where a relatively small expenditure will bring the facility to a 100% condition.
(10) Continuity over important trunk lines.
(11) Concentration to produce a strong demonstration.
(12) Availability of materials.
(13) Adjacent to communities where a serious departmental relationship exists — other things being equal.
(14) Units to fit into a long-range plan for 3-5 years.

Item (11) warrants special explanation. One of the chief difficulties today in merchandising good traffic engineering elements, controls or designs is that there are not enough excellent examples with excellent results which can be used as samples or illustrations. If examples cannot be pointed out, the idea falls in the theoretical class and is hard to put across. Thus strenuous methods should be made to have at least one one-hundred per cent perfect case of each traffic engineering technique such as signs, signals, markings, islands, channelization, intersection redesign, new intersection, stretch of highway, illumination, and if at all possible, one ideal route having a high rate of speed. If most signals are only 40% of what they should be, it will not be easy to get money to improve them or to put in more unless one case can be held up, shown to people, and pictured to show exactly what is desired.

Research: The twelfth administrative process is research. Traffic engineering cannot improve unless both theoretical and practical research is conducted to find out better ways of moving traffic faster, safer and more economically. Research takes time, personnel and money. Somehow about 10% of these items must be salvaged from routine work and put on research. The word research should appear in the budget and on the organization chart as a regular activity of the division. Little progress can be made in the long run if research is attempted by merely saying nothing about it and trying to steal a little time and money from normal operations. It must be brought out into the open and pushed.

Personnel Control: The thirteenth process is personnel control. Each man must be given clean-cut authority and responsibility, otherwise he will be reluctant to act for fear of stepping on someone else's toes and will have little pride in his work. For every important position, the division should be training a second man to ultimately move up into that position. There is nothing sadder than a department with excellent men at the top and at the bottom, but with poor men with potentially low ceilings in the middle. Promising young men must be employed at the bottom. Through training and experience men must be moved up. Frequent but small increases are far better for the morale than large but infrequent ones. The men must be taught how line and staff control operate, or confusion and irritation will result.

Professional Contacts: The fourteenth administrative procedure is that of frequent contact and exposure of the executives and junior executives to keep them posted on new developments, give them confidence through checking their conclusions, and broaden their outlook. Travel, committee

(*This article continued after index*)

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"The objects of the Institute shall be the advancement of the art and science of traffic engineering, the fostering of traffic engineering education, the stimulation of original research in traffic engineering, the professional improvement of its members, the encouragement of intercourse between men with mutual interests in traffic engineering, and the establishment of a central point of reference and union for its members. (Article 1, Section 4 of the Constitution of the INSTITUTE OF TRAFFIC ENGINEERS.)"

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Compiled by William B. Powell, *Member I.T.E.*—Consulting Traffic Engineer

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TRAFFIC ENGINEERING

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work, and contact work are strongly recommended. Frequently local research can be tied in with committee work. It must be remembered that professional contact work must be planned and carried on each month in the year.

There are many other important administrative and quasi-administrative subjects which space limitations will not permit covering at this time.

In an organization of fairly large size, administration is practically a full-time job and leaves little time for technical supervision or detailed technical work. Yet without it the rest of the men will not do their best work, additional funds and manpower cannot be obtained, and the field of traffic engineering cannot be advanced to its maximum potential importance. It may be sad to realize that when the engineer becomes an administrator, he will probably not have 10 per cent of his time left for pure engineering, if he is to get the job done and advance himself and the profession. But the objectives are more important than personal likings, and administration must be improved.

Part II of an original article by Maxwell Halsey (Member ITE), Associate Director, Bureau for Street Traffic Research, Yale University.

ASPHALT-QUARTZITE CHIP TRAFFIC LINES

By L. D. Howard

THE South Dakota State Highway Commission has experimented with the use of an asphalt-quartzite chip traffic line and the following remarks are offered as our conclusion to date. Use of this type of traffic line is somewhat new and any conclusions drawn from our experiments would be purely on assumption. However, during our maintenance experience on bituminous surfaces the exact application methods have been used in some surface treatments and observations show that the quality and desirability of such application as a traffic line can be assured as successful and economical. For instance the surface maintenance method of embedding a ⅜" to ⅛" clean chip in a rapid curing asphalt has shown a distinct contrast to the adjacent surface for the period of 3 to 5 years.

The idea to use the embedding of limestone or quartzite chips in a rapid curing asphalt as a centerline came to us from the observance of the above mentioned maintenance method and also because of the necessity to do something about the excessive costs and continual failure of a paint traffic stripe.

When it was decided to go ahead with the idea to apply the above mentioned type of stripe, a machine to apply the chips was necessary. The Highway Commission district office located in Huron designed this applicator. The method was to have a small unit so constructed as to uniformly apply a controlled amount of chips and immediately roll these chips in to a previously applied rapid curing asphalt stripe 4" wide.

The machine was constructed with this positive chip feed and a roller with approximately 160 lbs. per inch width of the roller, immediately behind the spread of the chips.

The first experiment was placed north of Wolsey, South Dakota on a

bituminous treated base course. We used quartzite chips ⅜"-⅛", clean and sharp, and an RC-1 asphalt as the embedding material. The application quantities were reduced from our first estimate of 65 gallons of RC-1 per mile and 3500 lbs. of chips reduced to approximately 40-50 gals. per mile RC-1 and 3000 to 3200 lbs. of chips. Several gradings of chips were tried, some with a fine material included under the ⅜", and ⅜" to ⅛" screened sand and within a few hours it was easily shown conclusively that the chips should be ⅜"-⅛", clean and sharp. Care must be taken to not apply an excess of the Rapid Curing Asphalt, to assure that no bleeding will occur later.

The chips used in this first experiment were a pink quartzite and hydrophilic by nature so undoubtedly a tar of the RT-7 specifications is preferable as the embedding material. In using a white limestone chip of the ⅜"-⅛" clean specification, the Rapid Curing Asphalts are satisfactory as the embedding material. The application of the embedding material should be figured close to ¼ gal. per sq. yd. and between ¼ and ⅓.

Observation of the applied stripe at this time shows a very favorable result by both day and night and no loss of its visibility can be noticed.

The application of the asphalt was done by using the regular center-line stripping machine. This made it easy to control the quantity and assure use of data to base our future conclusions.

There are several distinct advantages in the stripping method. At no time is it necessary to bother the traffic, the bitumen applicator and chip applicator may follow as close as 100' or less and immediately following the chip applicator, traffic can not injure the stripe.

The following analysis of costs as compared to paint is a definite proof of the economy, and this year the Highway Commission intends to go into the application much more extensively.

Equipment Rental	$13.425
Labor and Truck Drivers	48.895
Granite Chips at $2.60	54.60
Bituminous Road Oil—RC-1 or 3	140.995
TOTAL COST PER MILE	9.723
Cost per mile Granite Chips	3.765
Cost per mile RC-3 Bituminous Oil	2.586
Cost per mile application	3.372
Total cost per mile	9.723
Cost per mile White Paint	11.40
(Average 12 Gallons per mile)	
Cost application	1.60
	$13.00

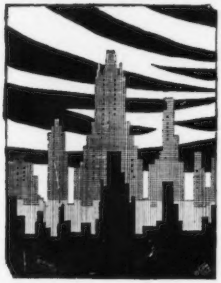
An original article by L. D. Howard, Safety Engineer, South Dakota State Highway Commission.

The Index Issue

In the center of the book, the readers of TRAFFIC ENGINEERING will find a complete index to Volume XI of TRAFFIC ENGINEERING that is completed with the April issue. It is the hope of your editor that you will bind the twelve issues of Volume XI of TRAFFIC ENGINEERING, placing the index also within the binder in order that you will have a complete index and reference for the past year.

Included in this index you will find the articles listed by their titles, the particular technical field to which they relate, and the page numbers. You will also find in the index a listing of the authors who have prepared these articles, as well as the page numbers upon which their particular articles appear.

It is the hope of the editorial staff that this index will prove helpful to the membership of the Institute of Traffic Engineers, and the readers of TRAFFIC ENGINEERING in order that they may locate immediately those articles they are most interested in.



Stop, Look and Listen

Evolution of "Traffic Engineering"

"With the April 1941 issue (Volume XI, No. 12) Traffic Engineering will complete its first full printed volume. The magazine first appeared in planographed form in May 1933 (Volume I, No. 1) as a news letter supplement to the Traffic Digest which had been issued since the early days of the Institute. In May 1934 Traffic Engineering was issued as Volume V, No. 1 to conform with the volume and issue number of the Traffic Digest of that month. In November 1937 the Digest and news letter were combined under the heading "Traffic Engineering" (Volume VIII, No. 7). In November 1938 a printed cover was added and in March 1940 (Volume X, No. 11) Traffic Engineering graduated into a full-fledged printed magazine with several pages of paid advertisements. It has been continued in this form throughout Volume XI."

National Conservation Bureau Engineering Changes

Robert S. Holmes (Junior I.T.E.), a Lieutenant in the Ordinance Reserve of the United States Army, was summoned to active duty on March 1. The National Conservation Bureau has granted Mr. Holmes a one-year leave of absence from his official duties there.

Eugene A. Barton (Junior I.T.E.), has been promoted to the Traffic Division of the Bureau. He has taken over the responsibilities formerly handled by Mr. Holmes, and shall now devote his full time to traffic engineering activities. Work in the Traffic Division will not be new to Mr. Barton, as he has devoted half his time during the past several years to conducting special traffic studies and city surveys for that division.

Rutgers University Awards Seven Hundred Safety Certificates

Professor Lawrence B. Tipton (Affil. I.T.E.), Head of the Bureau of Public Safety of Rutgers University, announces that on May 2 the academic year for the classes in safety offered by the University will be brought to a close.

During the past academic year, 700 certificates of proficiency in various fields of safety have been awarded to municipal, county, and state employees within the state of New Jersey.

Among the groups completing work offered through the Bureau of Public Safety of the University were thirty engineers attending a course in The Administration and Techniques of Traffic Engineering, instructed by Harold F. Hammond (Member I.T.E.). The classes conducted ranged from ten to twenty weeks in length.

Street Resurfacing, Reconstruction Costs of Growing Importance to Cities

An increasingly large number of cities are resorting to special assessments to raise funds for reconstructing and resurfacing their streets, the American Public Works Association said today after a survey of special assessment practices in 83 cities in 40 states and the District of Columbia.

"Reconstruction and resurfacing costs are becoming more and more important to cities as new construction declines with the gradual completion of their street systems," the Association said. "Special levies on benefited property for new construction have been the usual practice but the cities have only recently been driven to such levies for reconstruction and resurfacing by the increasing expenditures for this work."

More than half of the cities which can by law levy special assessments for reconstruction and resurfacing are doing so—35 cities levying for reconstruction and 29 for resurfacing. Almost all of the 83 cities may levy special assessments for new construction, but only 62 are doing so. The extent of special levies for new construction has been curtailed in recent years as the result of federal assistance, the Association added.

"The use of special assessments for municipal paving work depends to a great extent on existing state laws and local ordinances," according to the Association. "Under the statutes of Virginia, for example, cities are not permitted to levy special assessments for pavement resurfacing, reconstruction or new construction. They may, however, use special assessments for sidewalk and alley construction, reconstruction and repaving. Pennsylvania, Vermont, New Hampshire and Maine are among the states which permit cities to use special assessments only for new construction."

The survey showed the following division of costs—excluding the share the federal government pays on such projects as WPA—between the city and abutting property owners in typical street construction:

Abutting owners in nine of the 35 cities levying special assessments for pavement reconstruction pay the entire cost of the work; but in Indianapolis, Ind., the owners pay only 25% and the city pays the rest. Four cities —Wichita, Kan., Lexington, Ky., Omaha, Neb., and Las Vegas, Nev.— pay only the cost of reconstructing intersections. Peoria, Ill., pays 20% of the cost of reconstructing residential streets and 80% of the cost of arterial street reconstruction, and the abutting owners pay the rest. In Des Moines, Ia., the city pays 40% of the sponsor's share on WPA projects, nothing in some other cases. Other practices vary as widely.

The city pays none of the cost of resurfacing in eight cities, the property owners footing the whole bill. In Indianapolis, the city pays 75% of the resurfacing bill and the property owners the rest. The division of cost between cities and property owners in others of the 29 cities levying special assessments for resurfacing range between these extremes.

In 19 of the 62 cities which levy assessments for new construction, the abutting owners pay the entire cost and the city nothing. At the other extreme, the city's share of the expense is 80% in Ardmore, Penn.

Cities Regulate Overhanging Signs as Safety Measure

A trend toward more stringent regulation, in interests of public safety, of overhanging signs and displays in municipal business districts was reported today by the International City Managers' Association. Many cities require a permit for each sign or awning and levy license fees to pay costs

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of regulation, while some cities prohibit the use of overhanging signs on certain streets.

Permit fees for overhanging signs in Allentown, Pa., and Cedar Rapids, Ia., are $2 for each sign and $1 for awnings. Evanston, Ill., has a basic rate of $3 per sign plus an annual rental fee of 5 cents per square foot. The fee in Portland, Ore., is $5 for a temporary sign 42 inches or less in width, and $10 for a sign more than 42 inches wide.

Spokane, Wash., where overhanging signs are charged 5 cents per square foot with a minimum charge of $1, and Kenosha, Wis., Louisville, Ky., Baltimore, Md., and many other cities have comprehensive ordinances governing signs.

Regulatory ordinances, the Association said, usually indicate the extent, use and safety features which must be observed. Canopies and awnings extending past the building line and hanging over sidewalks generally are considered in the same class with signs as being in need of regular inspection and control.

Regulation of overhanging signs is needed because the signs, especially temporary ones, are a danger to pedestrians—particularly during strong winds when they may be blown down, the Association said. In addition, overhanging signs often hamper fire department operations, and neon and other lighted signs sometimes confuse motorists when traffic signals cannot be distinguished from a background hodgepodge of colors and symbols.

With respect to neon signs, the City Club of New York City recently asserted that red and green neon advertising signs create a serious traffic hazard, and urged passage of a municipal ordinance prohibiting the display of any new illuminated signs containing red or green colors less than 35 feet above street level.

What Are You Looking for in a Traffic-signal Controller?

A COLOR SEQUENCE THAT PROTECTS YOUR CITIZENS?

Many color sequences in use today are the result of limitations of yesterday's controllers. But, remember those 15 circuits and 16 intervals of the General Electric Type D controller—an almost unlimited choice of color-showing arrangements to provide proper change-warning signals and a special arrow or walk signal, if needed, for faster movement and greater safety.

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Conditions are sometimes hard to analyze accurately; they sometimes change after the installation has been made. But with the Type D controller you have a distinct advantage in that timing changes are easily made in definite one-per-cent steps. Even a change in the basic sequence of colors or movements can be made in a few minutes.

ABILITY TO MEET FUTURE REQUIREMENTS?

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Economy, Uniformity Are Sought in City Street Signs

The humble street sign has come in for especial attention from the authorities of two local governments—in Los Angeles County, where traffic officials are working out a system of uniform signs to help motorists; and in Flint, Mich.—where the city has found a way to save money in erecting street signs.

To prevent confusion of motorists by different systems of identifying streets, the Los Angeles county road department already has erected more than 13,000 uniform sign posts at approximately 7,000 intersections in the out-of-city areas of the county, the American Public Works Association reported today.

The names of streets are in white block enamel letters, three inches high, on blue metal arms mounted eight feet above ground on boiler tube posts sunk in concrete. Two posts are placed on diagonally opposite corners at intersections, with the exception of "T" intersections where only one is required.

The Los Angeles County traffic committee — a non-political group serving by order of the Board of Supervisors and composed of representatives of the California division of highways, California highway patrol, Los Angeles county road department, and the Automobile Club of Southern California — has recommended that 45 cities in the incorporated area of Los Angeles County also install uniform signs to aid the travelling public.

The city of Flint, Mich., is economizing by placing street name signs above stop signs on the same posts at street intersections. The savings come through a smaller number of posts being used in the city's program to mark all intersections along arterial highways.

Approximately 1,500 street sign units are being erected in the Flint program. Unpainted sapgum wood plates with raised letters are used for the signs. The plates are one inch thick and five inches wide. Black paint is used for the background and white paint for the face of the letters.

Amber Light Eliminated

Syracuse has amended its traffic regulations by eliminating the amber light on stop and go traffic signals. The three light signal system will be gradually reduced to two lights—red and green, so that traffic will be held on the red light until all traffic moving across an intersection on the green light has come to a complete stop. After long study the common council has come to the conclusion that this change would materially reduce traffic accidents, resulting from halted traffic through an intersection on the amber light before traffic moving on the green and amber lights had come to a full stop. This change will affect over 200 street intersections where signals have been installed.

Many Thanks!

The editorial staff of TRAFFIC ENGINEERING wishes to pay tribute to William B. Powell (Member I.T.E.), for the splendid job he has done in compiling the index for Volume XI of TRAFFIC ENGINEERING. We feel that the members of the Institute of Traffic Engineers, and the many readers of TRAFFIC ENGINEERING will agree with us in congratulating Mr. Powell.

Your editor would like to suggest that the index has been inserted in TRAFFIC ENGINEERING so that it can be removed easily for binding purposes.

Mid-West Safety Conference

On Wednesday afternoon, May 7, the Institute of Traffic Engineers will take an important part in the 19th Annual Mid-West Safety Conference being conducted at the Sherman Hotel in Chicago, Illinois on May 7 and 8.

The following afternoon session will

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Presiding: Hawley S. Simpson, Research Engineer, American Transit Association, New York City, New York.

1. Value of a State Manual of Uniform Traffic Control Devices.
   H. H. Harrison, Traffic Engineer, Illinois Division of Highways, Springfield, Illinois.
   Discussion: D. Grant Mickle, Traffic Engineer, City of Detroit, Michigan.
2. Minimizing Night Traffic Hazards.
   Howard F. Ilgner, Superintendent and Chief Engineer, Bureau of Electrical Service, City of Milwaukee, Wisconsin.
   Discussion: Earl J. Reeder, Chief Traffic Engineer, National Safety Council, Chicago, Illinois.
3. Pedestrian Control and Protection.
   Rufus G. Jasper, Traffic Engineer, National Safety Council, Chicago, Illinois.

At the end of this session the new National Safety Council motion picture on pedestrian control entitled "Are Your Feet Killing You" will be shown.

Traffic Congestion Causes Estimated $18,000,000 Yearly Economic Loss in Detroit

The annual economic loss from traffic congestion in Detroit is estimated at $18,000,000 by the Michigan state highway department, the American Public Works Association said today. This does not include economic losses resulting from traffic accidents.

The $18,000,000 represents an increase of 75 per cent in yearly economic losses since 1936 despite a $30,000,000 street widening program and other projects carried out by Detroit, the Wayne county road commission and the state highway department, according to a recent study by the highway department. While these projects kept congestion from rising more than 14 per cent in four years,

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they could not cope with the 35 per cent increase in total traffic since 1936, according to the study.

In making the study, the cost of congestion was based on gasoline wastage, estimated to be about a third, extra wear on brakes and motor parts, and time lost by drivers of commercial and passenger vehicles. A value of three-fourths of a cent was put on every minute lost by passenger cars, 1.47 cents for buses and commercial cars, and 1.38 cents for taxes.

During 1940, Detroit streets carried a daily average of 10,590,000 vehicle miles of traffic. The state highway department said that about 64 per cent of this daily mileage was definitely hampered by congestion.

Court Upholds Tax on Non-Residents for Use of City Streets

A Paducah, Ky., ordinance imposing an annual license tax of $5 on non-residents who operate motor vehicles on the city's streets has been held valid by the state court of appeals, according to the American Public Works Association.

The court said the tax is imposed under the city's police power for the privilege of using the city's streets, and is not a tax on non-residents' automobiles.

The ordinance covers all non-residents who use the streets in connection with a business conducted or regular profession followed within city limits, or as a means of conveyance to and from a job in the city.

Another ordinance involving the use of city streets, this one aimed at traffic safety, was upheld recently by the Tennessee state supreme court. The ordinance, adopted by Chattanooga, requires all motor vehicles driven on the streets of the city to be inspected by the city every six months.

The court's decision was that the ordinance, which imposes a charge of 25 cents per each inspection, was not in conflict with state statutes but was a reasonable exercise of the police power to protect the public and make the city's streets safe.

Applications for Membership

Robert S. Moyer
1626 Salem Avenue
Dayton, Ohio
(Division Traffic Engineer, Ohio Department of Highways, Div. #8)

Major Morris Belkin
817 S. Park Street
Kalamazoo, Michigan
(City Traffic Engineer, City of Kalamazoo, Mich.)

Russell S. Deetz
Until June 1, 1941—80 Howe St., New Haven, Connecticut
After June 1, 1941—Ohio Department of Highways, Columbus Ohio
Home Address: 144 Linden Ave., Newark, Ohio

Wayne N. Volk
1240 Sweet Briar Road, Shorewood Hills, Madison, Wisconsin (home address)
Until June 1, 1941 — Bureau for Street Traffic Research, Yale University, New Haven, Connecticut

Looking Ahead

May 6-8, Chicago, Ill.: Midwest Safety Conference. (Hotel Sherman.) Geo. G. Traver, manager, Greater Chicago Safety Council, 222 North Bank Drive, Chicago, Ill.

May 22-24, Norfolk, Va.: Seventh Annual Va. State-wide Safety Conference. (Monticello Hotel.) Wm. M. Meyers, executive secretary, Richmond Safety Council, 30 Allison Bldg., Richmond, Va.

August 18-21, Buffalo, N. Y.; International Association of Chiefs of Police. William P. Rutledge, 3131 E. 60th St., Chicago, Ill.

October 6-10, Chicago, Ill.: 30th National Safety Congress. (Stevens Hotel.) W. H. Cameron, Mgr. Director, 20 North Wacker Drive, Chicago, Ill.